OKAWAY Industries Inc

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# R300T SERIES
# COLOR PAPERLESS RECORDER

# User's Manual

## General specifications

This operating manual contains the technical information about R300T Series paperless Recorder. Other instrumentation which is available and is not listed herein can be viewed and download at www.okaway.com. Since new technology developed and existing products are updated without prior notice,

Please contact your representative or the OKAWAY sales center in Markham, Ontario, Canada to ensure you have the latest instrumentation documentation.

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# SECTION 1 GENERAL DESCRIPTION

## CHAPTER 1 BENEFITS AND FEATURES

### BENEFITS

R300T Color Paperless Recorder is an advanced paperless recording instrument, which developed, based on the years of expert experience and solid technologies foundation. R300T is designed for advanced features and high quality performance. The instrument uses high brightness and wide viewing angle 5.6" (10.4") large TFT color Liquid Crystal Display (LCD), updates and uses new hardware structure, and improves anti-interference ability. R300T is convenience to use under different conditions at control room or field.

### FEATURES

✧ Multi-channel Input and Output

Inputs： Variety type of input signals can be mixed, 12 Channel (Maximum)
Powered Outputs： 24V DC, 6 Channel (Maximum)
Relay Outputs： 12 Channel (Maximum)

✧ Multi-Function Screen Display:

Using 5.6 inch TFT LCD Display Panel, it can display English /Chinese menu, Input signal, Measured and calculated values, Processing data, Engineering units, Trend curves, Bar-graph display, Output and alarm condition, Historical trending, etc.

✧ Quick and Easy Front Panel Operation:

Quick and Easy English/Chinese Menu，Helping user to complete the parameter settings step-by-step;
Clarity English Chinese Information, Indicating and displaying the engineering meaning of the data;
Enriched Graphical Display, Providing the combination of all the required parameters;
Easy-Touch Front-Panel Keypad. All the operations are user-friendly;

✧ Screen Display:

Large Screen Liquid Crystal Display (LCD) Graphic Display Screen with adjusted Lighted Background. display in English characters, aphetic letter process curves and light spot. Press keys on the front panel to change screens, search historical data backwards and forwards, adjust contrast of the screen display and change screen time axis settings

✧ Parameters Setting:

Basic configuration: press front panel keys with English /Chinese menu prompt, technical configuration: using communication port and software, higher lever with password protection.

✧ Alarm Function:

Every channel can set up to 4 alarms, alarm configuration includes: high alarm or low alarm output selection, alarm output delay time, alarm dead band, relay contact output (using 4 relay repeatedly), alarm buzzer output, as well as external alarm horn contact and automatic change to alarm screen. Every channel will keep the latest 16 alarm information.

✧ Controls:

Select ON/OFF relay contact output with dead band, the capacity of contact is AC220V/3A

✧ Communication Output:

RS232/485
Baud Rate **1200 ~ 57600**pbs (TTL electric level，right side port)
Baud Rate **1200 ~ 19200**pbs (with optical isolation，rear panel port

✧ Protection:

Parameters configurations saved permanently when power off, use special designed WATCHING DOG circuit to keep parameters safety.

✧ Printing:

Supply serial port connection (i.e. LQ-300K) with additional order option, Connect to panel mount micro printers or printer with serial port connector, it is ideal to print historical data or curves.

✧ High Capacity Memory:

Pre-installed high capacity internal memory, maximum 192 M Bit Memory. Every recorded point will keep its largest and smallest values during the measurement，even though recording the transience changes. Additionally, data can be saved to the high capacity external FASH MEMORY ROM for further use.

✧ Communication Rate:

Unit comes with bi-directional serial communication port; it can exchange the data to the upper level peripherals or other related devices with baud rate up to 57600 bps. RS-232 or RS-485 communication method can be choose.

✧ Flexible Additional Functions:

Using additional modules and corresponding parameters setting, instrument can provide analog altering signal output, printer interface signal output, direct current power output, standard bi-directional serial communication port, alarm buzzer output, etc. Flexible calculation channel method will realize many requirements with special functions.

✧ Powerful Trending Function:

Single Step Trending;
Continuous Automatic Trending (Trend speed up to 20 steps adjustable);

Searching Trending by time;

Searching historical data and curves by moving the Axis.

# CHAPTER 2 TECHNICAL DATA

## ✧ Input Signal

Input channels and sampling period

| Model | Inputs | Sampling period | Record Interval |
|---|---|---|---|
| R300T02 | 2 | 250ms<br>（Refresh Cycle: 1s） | 1-240s |
| R300T04 | 4 | 500ms<br>（Refresh Cycle: 1s） | |
| R300T06 | 6 | 1s<br>（Refresh Cycle: 1s） | |
| R300T08 | 8 | | |
| R300T12 | 12 | | |

Input types and scale range and accuracy:

| Input Types | Range | Measurement Range | Accuracy |
|---|---|---|---|
| Voltage (DC) | 0~20mV | -9999~99999 | ±0.1% |
| | 0~100mV | -9999~99999 | ±0.1% |
| | 0~5V | -9999~99999 | ±0.1% |
| | 1~5V | -9999~99999 | ±0.1% |
| Current (DC) | 0~100mA | -9999~99999 | ±0.2% |
| | 4~20mA | -9999~99999 | ±0.2% |
| TC | S | -50.0~100.0℃ | ±3.7℃ |
| | | 100.0~1768.0℃ | ±2℃ |
| | B | 0~1820.0℃ | ±2℃ |
| | K | -50.0~1372.0℃ | ±2℃ |
| | E | -50.0~1000.0℃ | ±2℃ |
| | J | -50.0~1200.0℃ | ±2℃ |
| | T | -199.90~320.00℃ | ±2℃ |
| | Wer3-25 | 0.0~2300.0℃ | ±5℃ |
| RTD | Pt100 | -200.0~850.0℃ | ±1℃ |
| | Cu50 | -50.00~150.00℃ | ±1℃ |
| DI | Voltage (DC) Input （TTL） | OFF：< 2.4V<br>ON： >2.4V | |
| | Contact Input | Contact：on/off | |
| Frequency | 0—15khz | 0~99999 | ±1 |

(Normal Operating Conditions: 23±2℃, 55±10%RH, power supply: 90～260VAC, 50/60Hz±1%, preheating >30mins, and vibration has no effect on the recorder.)

**Cold Junction Compensation:**

Internal temperature compensation; direct temperature compensation setting;
Special channel temperature compensation.

**Cold Junction Compensation Accuracy:**

S、B、Wre： ±1℃
K、J、E、T： ±1℃（Measured when ≥0℃）

**Maximum Input Voltage:**

Voltage range ≤2VDC and thermocouple： ±10VDC(continued)
Voltage range ≤6VDC： ±50VDC（continued）

**Input Impedance:**

≥10 MΩ on lower than 2 VDC Ranges
≈ 1 MΩ on lower than 6 VDC Ranges

**External Input Impedance:**

DC Voltage, Thermocouple input: ≤ 2K Ω
RTD Input: each wire ≤10 Ω, (3 wires must be equal)

**Biased DC Current：** ≤10nA

**Common Mode Interference Voltage：** 250V AC rms(50/60 Hz)

**Common Mode Rejection Ratio (CMRR):**

120dB (50/60Hz±0.1%, 500Ω unbalanced ground terminal---negative)

**Series Mode Rejection Ratio (SMRR) ：** 40db (50/60 Hz±0.1%)

**Channel Interference Voltage：** Max. 250VAC rms（50/60 Hz）

**Channel Interaction：** 120dB(input external impedance 500 Ω， voltage of input to other channels: 60V)

## ✧ Output Signal

**Analog Output：**

| | |
|---|---|
| Current | 0~10mA（Load≤750 Ω） |
| | 4~20mA（Load≤500 Ω） |
| Voltage | 0~5V (Load≥250K Ω) |
| | 1~5V (Load≥250K Ω) |

**Digital Output：**

| | |
|---|---|
| Relay Contactor rate | AC220V/3A or DC24V/5A（resistive load） |
| SSR Output | 400V/0.05A |
| | 5~24V/0.05A |
| Sourcing Output | DC24V/25mA (isolated current limited) |
| | |

## ✧ Display

**Display Type :** 5.6”(10.4”)TFT Color LCD（320×234 dot matrix）

**Curve/Bar Graph Display Color：** 8 colors

**Background Color：** Black is default color; white is an option.

**Display Modes：**

Measuring data display (curve display, digital display, bar graph display), full channels display, one channel display (recent alarm overview display, alarm historic overview, recorder setting information overview, report form overview), historic recording display.

**Curve Display：**

| | |
|---|---|
| Display group | Maximum 6 groups |
| Channels in one group | Maximum 4 channels |
| Upgrade cycle of wave form | Same as Recording Interval |
| Direction | Vertical or Horizontal |
| Scale | 4－12 division |
| Other information display | Data, grid, Time/Date, courser, Engineering unit, communication status, wire burnout |

**Digital Display：**

| | |
|---|---|
| Channels in one screen | Dual or Full Channels Refresh rate: 1second |
| Display contents | Measurement data, unit, alarm status, and time/date |
| Full channels display | Refresh rate： 1second |
| Display contents | All Channels measurement data, and Alarm status |
| Overview display | Display contents：Alarm, information, and Event overview |
| Recording Rates | Programmable from 1 second to 240 seconds |

✧ Alarm:

**Programming：** 4 alarm set points per channel
**Alarm Types：** High/Low alarm, alarm delay (0 to 7 seconds, applicable to all channels)
**Display:** Display Alarm status (alarm types) in data display section, and can be set to auto switch to current Alarm/Event overview display screen.
**Data Storage：**
Storage information：Alarm On/Alarm Off Time，Alarm Types, and Alarm Point.
Storage Capacity：Maximum 120 messages
**Alarm Sound：** Buzzing, or external sound by programming relay outputs
**Output:** Relay output contacts: 2, 4, or 8,12
**Action：** Excite/no excite, retention/ no retention

✧ Alarm Relay Output（/J0-/J12）

**Output:** 0-12 normally open contacts
**Option:** 0-6 normally open/normally close contacts

**Contactors rating:** 30V DC / 5A (resistive load)
250V AC (50/60 Hz) / 5A
**Output types：** NO－C－NC（Excite/No Excite, AND/OR Retention/No Retention）

✧ Serial Port Communication（/C2，/C3）

**Feature**: Controlling and programming by PC, and transfer data to PC.
**Media**: Comply with EIA RS－232（/C2）, or RS－485（2 wires）（/C3）
**Protocol：** SR-BUS, or Modbus RTU protocol
**Synchronous Mode：** Start/Stop
**Communication Mode**（RS-485）：2 wires semi-duple multipoint connection（1：N，N＝1～32）
**Transfer Rate：** 1200,2400,4800,9600,19200, 38400, 57600bps
**Data Length：** 8 bits
**Stop Bit：** 1bit
**Odd Even Effect：** Non
**Longest Distance：** 1.2 km(RS-485)

**Communication Mode:**
ASCII is for special protocol input/output, and MODBUS protocol for binary mode.
**Modbus Communication:** Action Mode: RTU SLAVE

## ✧ 24V DC Transmitter Power Output (/P1-/P6)

**Output Voltage:** 22.8～25.2V DC (at rated load current)
**Rated Output Current:** 4～20mA
**Maximum Output Current:**
25 mA DC(isolated current limited output)
60 mA DC (special order)
**Wire Resistance Range:**
RL＜(17.8V transmitter threshold voltage)
/0.02A (excepted voltage drop on 25Ω load resistor)
**Maximum Wire length:** 2 km (using CEV Cable)
**Isolation Resistance:** Output to grounded ≥20MΩ (500V DC)
**Isolation Voltage:** Output to grounded 500V AC (50/60Hz; i=10mA); 1 minute
**Terminal to Terminal:** 500V AC (50/60Hz; i=10mA); 1 minute

## ✧ Memory Capacities

**Measurement Data:** 4bytes per data
**Recording Data:** 4bytes per channel recording point (Recording Max/Min data in the time interval)

## ✧ Installation

Panel mounted (vertical panel), and locking bar assembly. Allow to lean back < 30°

| Dimensions: | Panel Cutout |
|---|---|
| 144×144×240 mm (R300T100) | 138×138 mm |
| 288×288×240 mm (R300T200) | 281×281mm |

## ✧ Power Supply

**Nominal Voltage:** 220VAC +10-15%
**Voltage Ranges:** 90～260 VAC
**Rated Power Frequency:** 50～60 Hz
**Power Consumption:** ＜25W
**Temperature Range:** 0～50℃
**RH Range:** 20～80% RH (5～40℃)

## ✧ Weight:

R300T1 Approx. **2700 g**
R300T2 Approx. **4000 g**

✧ Memory Capacity:

Maximum Capacity: 192MBit; Data Recording Time according to number of channels, memory size and recording time interval 8 see the table as follow:

| CAPACITY (M bit) | RECORD INTERVAL (S) | No. of CHANNEL | APROX.RECORD TIME(DAY) |
|---|---|---|---|
| 64 (MANUFACTURER INSTALL) | 10 | 1 | 152 |
| | | 2 | 76 |
| | | 4 | 38 |
| | | 8 | 18 |
| | | 12 | 12 |
| | 240 | 1 | 3663 |
| | | 2 | 1831 |
| | | 4 | 915 |
| | | 8 | 438 |
| | | 12 | 292 |
| 128 (OPTIONAL) | 10 | 1 | 327 |
| | | 2 | 163 |
| | | 4 | 81 |
| | | 8 | 39 |
| | | 12 | 26 |
| | 240 | 1 | 7850 |
| | | 2 | 3925 |
| | | 4 | 1962 |
| | | 8 | 938 |
| | | 12 | 625 |
| 192 (OPTIONAL) | 10 | 1 | 501 |
| | | 2 | 250 |
| | | 4 | 125 |
| | | 8 | 59 |
| | | 12 | 39 |
| | 240 | 1 | 12037 |
| | | 2 | 6018 |
| | | 4 | 3009 |
| | | 8 | 1439 |
| | | 12 | 960 |

# CHAPTER 3 ORDERING INFORMATION

## Ordering Code

| Model | Code | | Additional Code | Description |
|---|---|---|---|---|
| R300T1<br>R300T2 | □□ - □ - □ | | /□□□ | Dimension 144X144 |
| | □□ - □ - □ | | /□□□ | Dimension 288X288 |
| Channels | 02 ~ 12 | | | For R300T1 *1 |
| | 02~ 32 | | | For R300T2 |
| Memory Capacity | | -1 | | 64 Mbit （Standard） |
| | | -2 | | 128 Mbit |
| | | -3 | | 192 Mbit |
| Language | | -0 | | English |
| | | -1 | | Chinese |
| Additional Option | | | /J(1-12) | N.C output Channels |
| | | | /JB(1-8) | N.O/N.C Output Channels |
| | | | /P(1-6) | DC24V Sourcing Channels |
| | | | /C2 | RS-232 Connector *2 |
| | | | /C3 | RS-485 Connector *2 |
| | | | /AO(1-4) | Transmitter Output Channels *3 |
| | | | /F(1-4) | Frequency Input Channels *3 |

*1 Able to provide maximum 16 channels for special order.

*2 Cannot select /C2 and /C3 at same time. If use micro-printer, the RS-232 connector must selected.

*3 If choose analog output or frequency input, maximum 8 universal channels are available.

Example of Ordering Code:
R300T106-2-0/J4 /C2
R300T1---- Color Paperless recorder
06----- 6 input channels
2----- 128 Mb memory
0----- Chinese (Simplified)
/J4----- 4 normally open contacts output
/C2----- RS232 connector

✧ Note*：

The instrument, with RS232 communication function, can connect to printers with serial port and print.

✧ Part List

| ITEM | SET |
|---|---|
| R300T Recorder | 1 |
| R300T Operating Manual | 1 |
| Mounting Bracket | 2 |

# CHAPTER 4 INSTALLATION AND WIRING

## 4.1 INSTALLATION INSTRUCTIONS

### ✧ Installation Instructions

Before installation and wiring, read the attached nameplate carefully about details of type, power supply.
Avoid mounting on the following locations:

Atmosphere Temperature lowers than 0°C degree or higher than 50 °C
Atmosphere Humidity lower than 10% or higher than 90%
Atmosphere with Corrosive gases
Possible spurt of water, Oil, Chemicals, Vapor or Steam
Do not mount this instrument directly above equipment that generates large amount of heat or heavy shaking
Do not mount this instrument close to the equipment with strong electro-magnetic interference.

### ✧ Installation Procedure

In order to mount the recorder, you need a steel plate thicker than 2mm as a panel, with a designed cutoff hole.
Procedure of installation as follows:

1. Take out the mounting brackets from the instrument package
2. Through it in the cut off hole from the front of the panel.
3. Fit the mounting brackets into the square holes in the top and bottom surface of the case.
4. Tighten the screws of the mounting brackets with a screw driver , let it fixed to the panel.

### ✧ Installation Figure

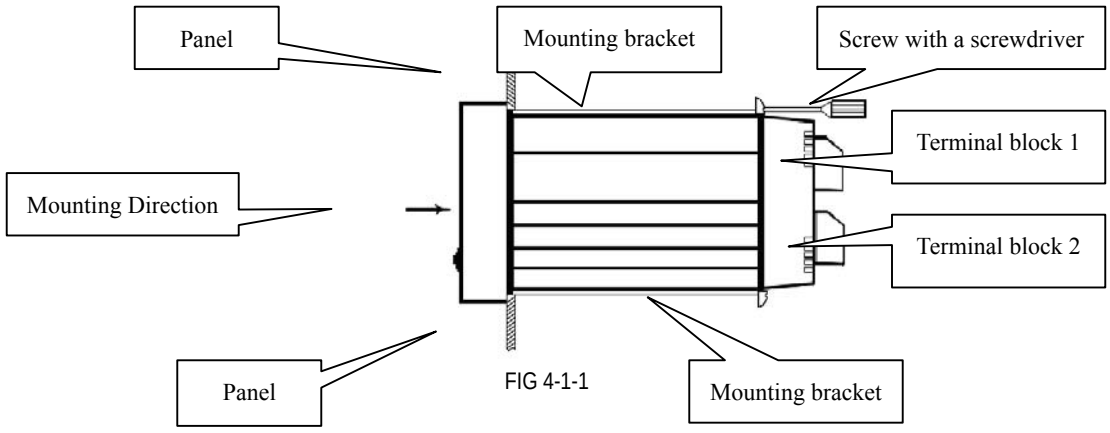
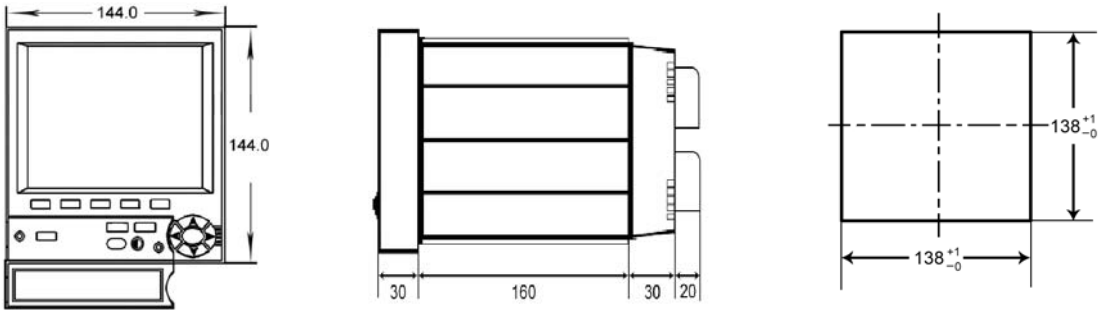
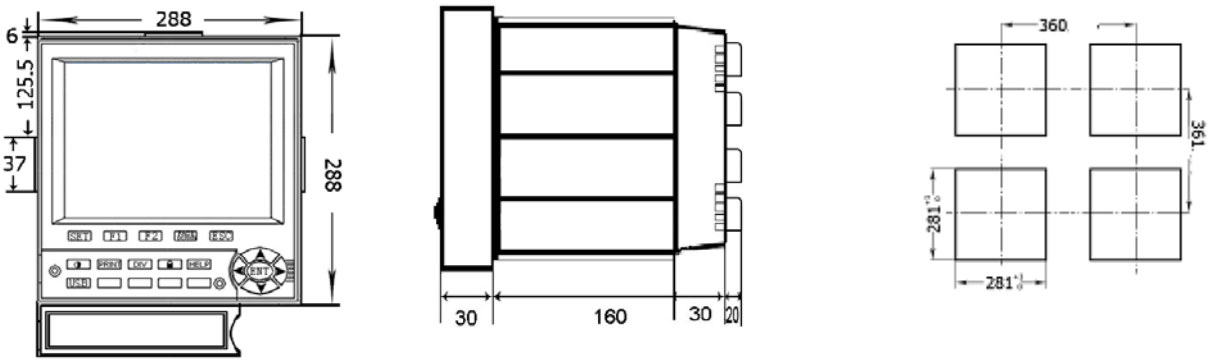



FIG 4-1-1

✧ Dimensions and Cutout Size（R300T100　144×144×240 mm）

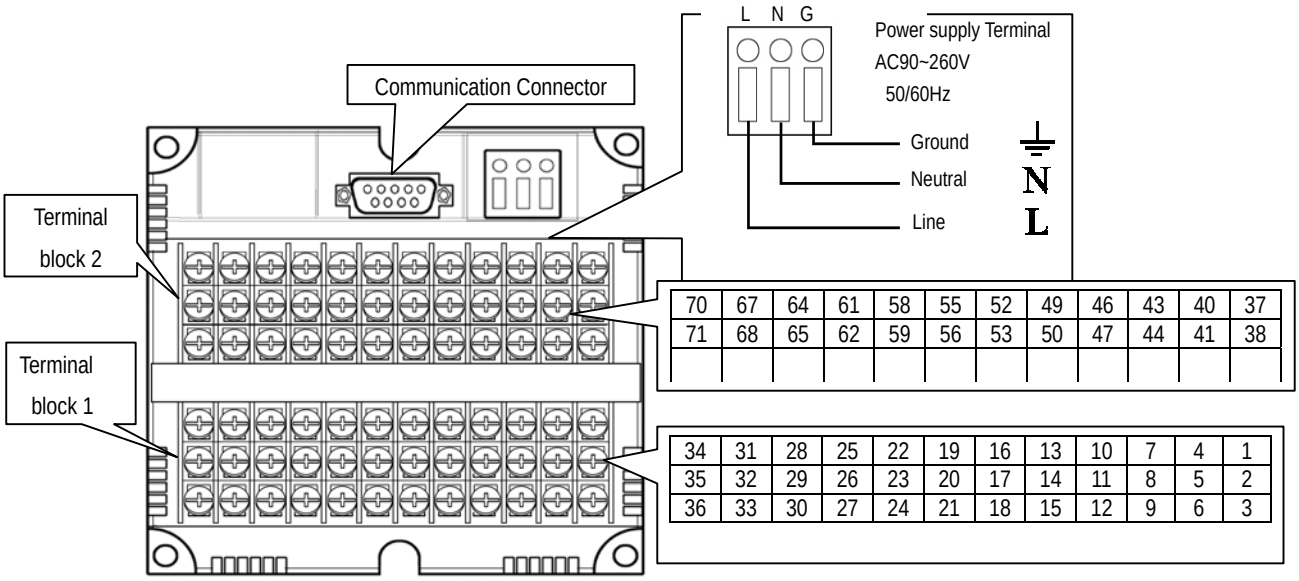



✧ Dimensions and Cutout Size（R300T200　288×288×240 mm）



## 4.2.1 WIRING DIAGRAM (R300T100)

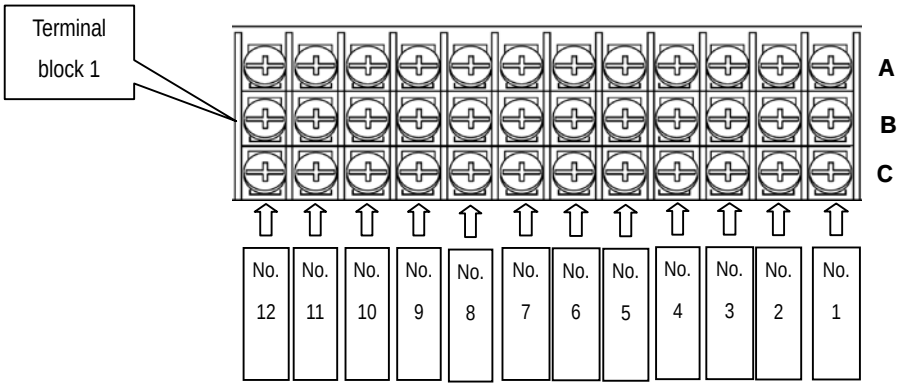
### ✧ Rear Panel View



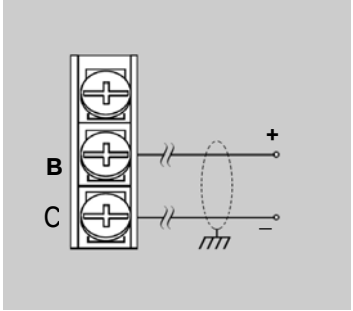

### ✧ Terminal Number and Description

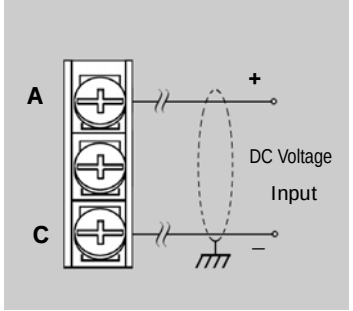
| Terminal No. | Description | Terminal No. | Description |
|---|---|---|---|
| 1 - 36 | Analog Signal Input | 37 - 48 | 24VDC Sourcing Output |
| 25 - 36 | Transmit output、frequency and digital input | 49 - 72 | Relay Output |

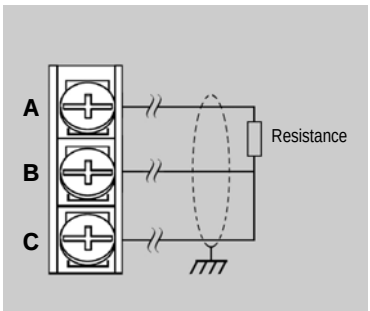
### ✧ Analog Input wiring

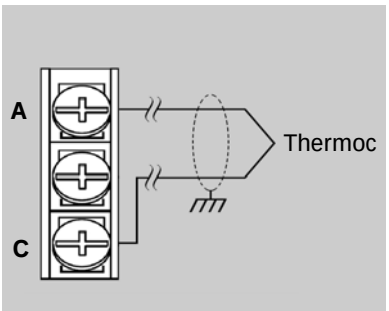



The recorder provides maximum 12 universal input channels. Following is the signal input example of No. 1 Connection. Other connections are the same.

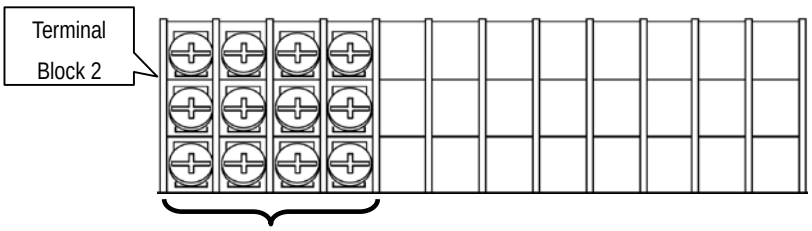


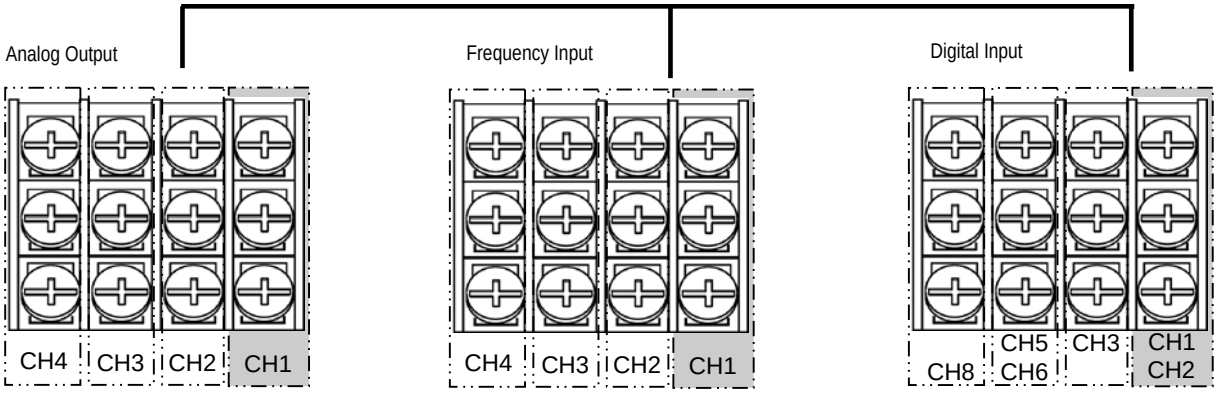



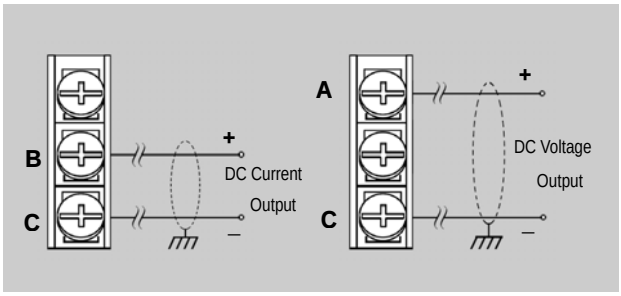



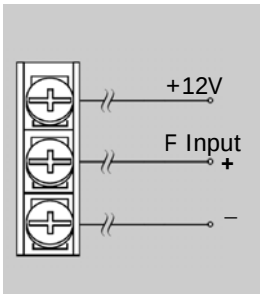
## ✧ Multi-Function Terminals Wiring

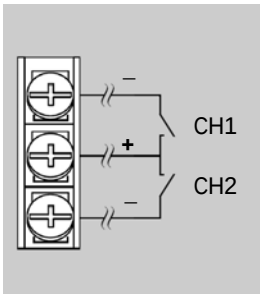



No.9-12 terminals are multi-functions terminal, when they connected special signal, the recorder is able to provide maximum 8 universal input channels.

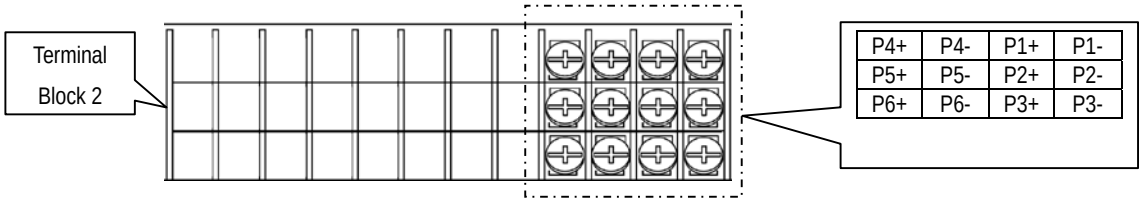


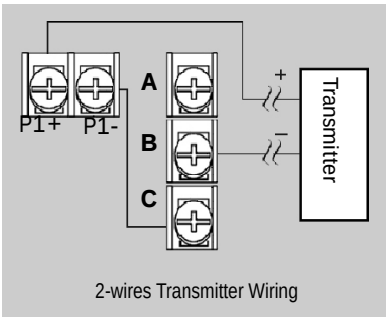



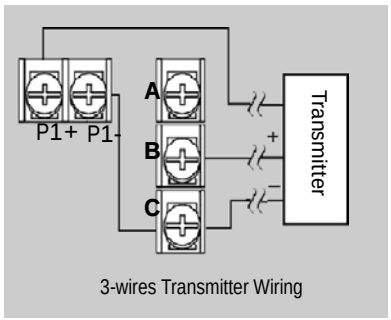



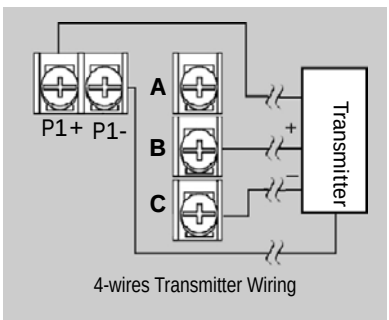




## ✧ DC24V Sourcing Output Wiring



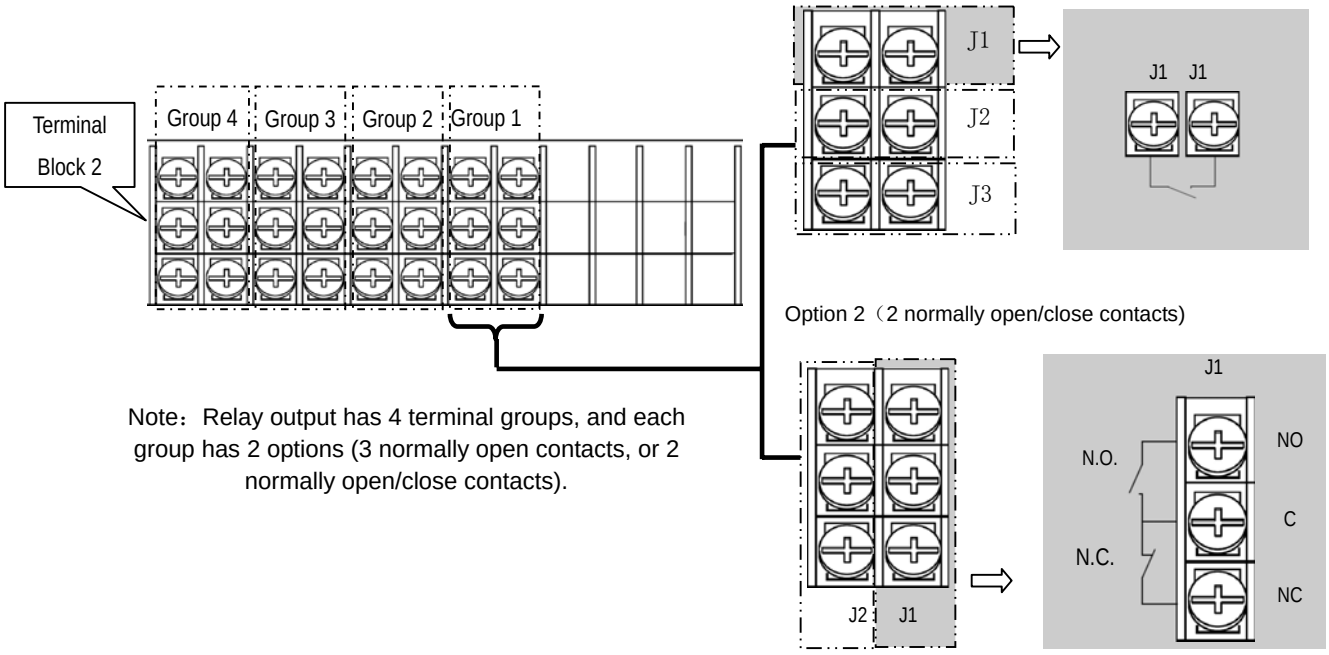



Note：Provided maximum 6 channels of DC 24V/25mA isolated current limited output. If need high current capacity, please indicate when you place order.

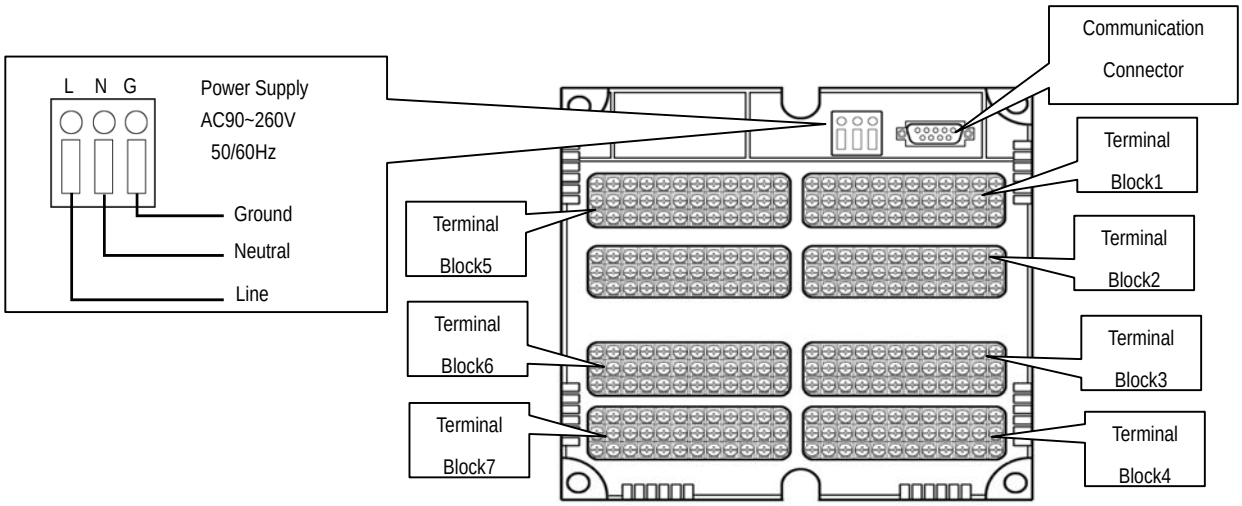
✧ Relay Output Wiring



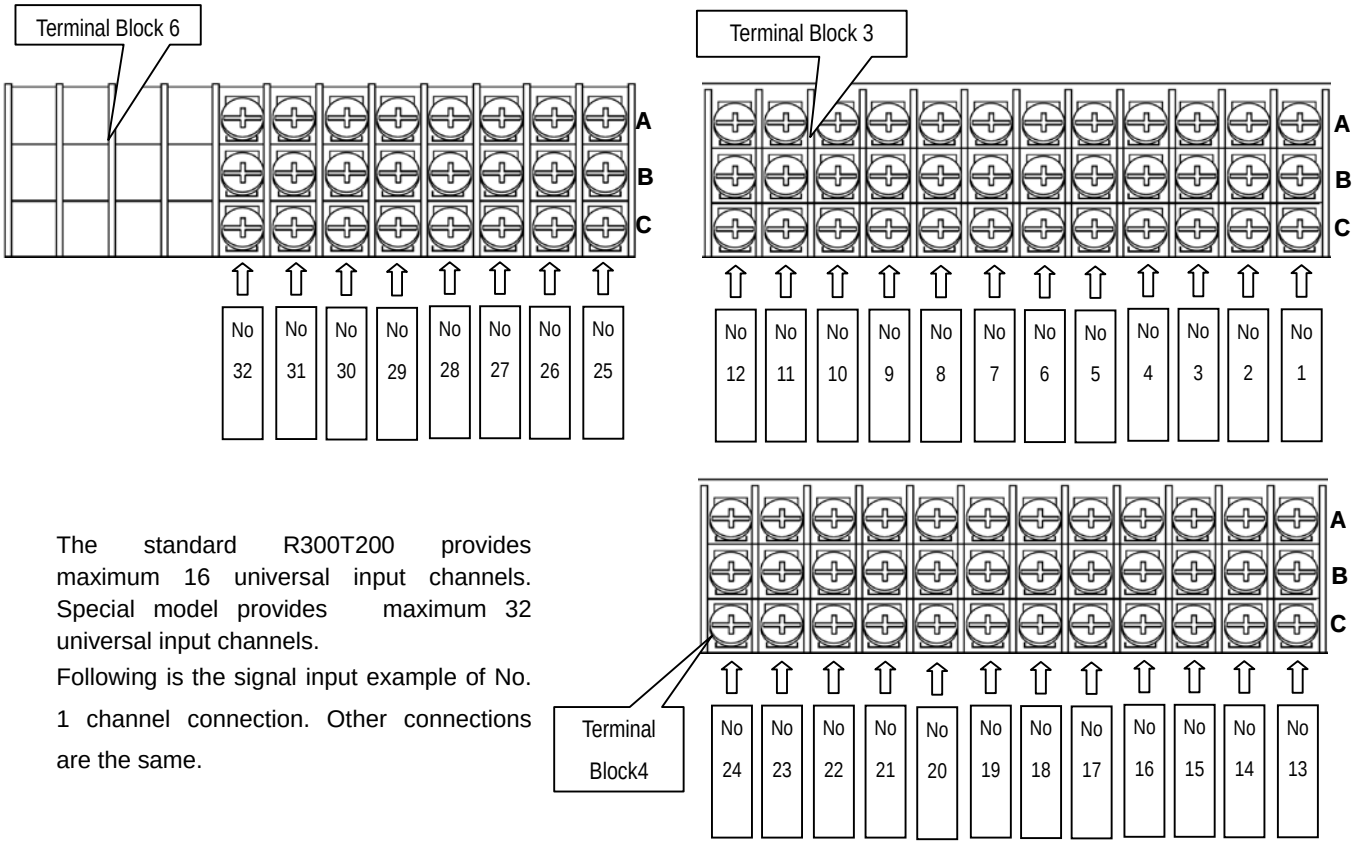

Note：Relay output has 4 terminal groups, and each group has 2 options (3 normally open contacts, or 2 normally open/close contacts).

## 4.2.2 WIRING DIAGRAM (R300T200)

✧ Rear Panel View

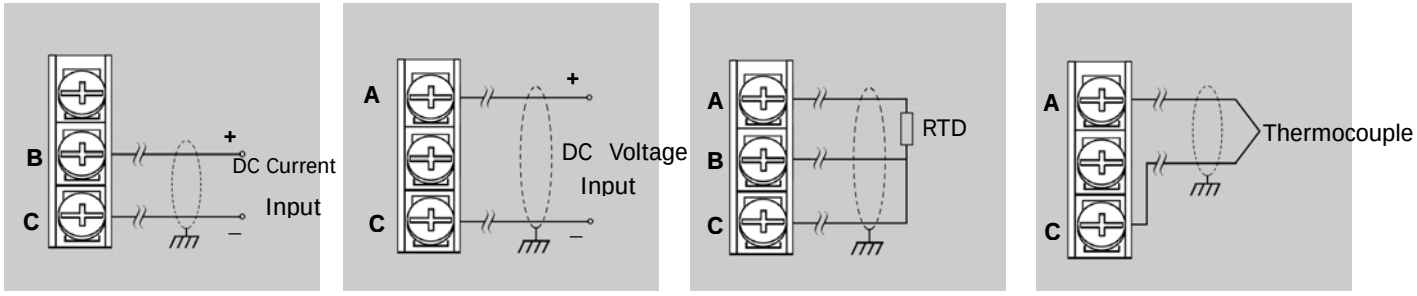


## ✧ Analog Input Wiring

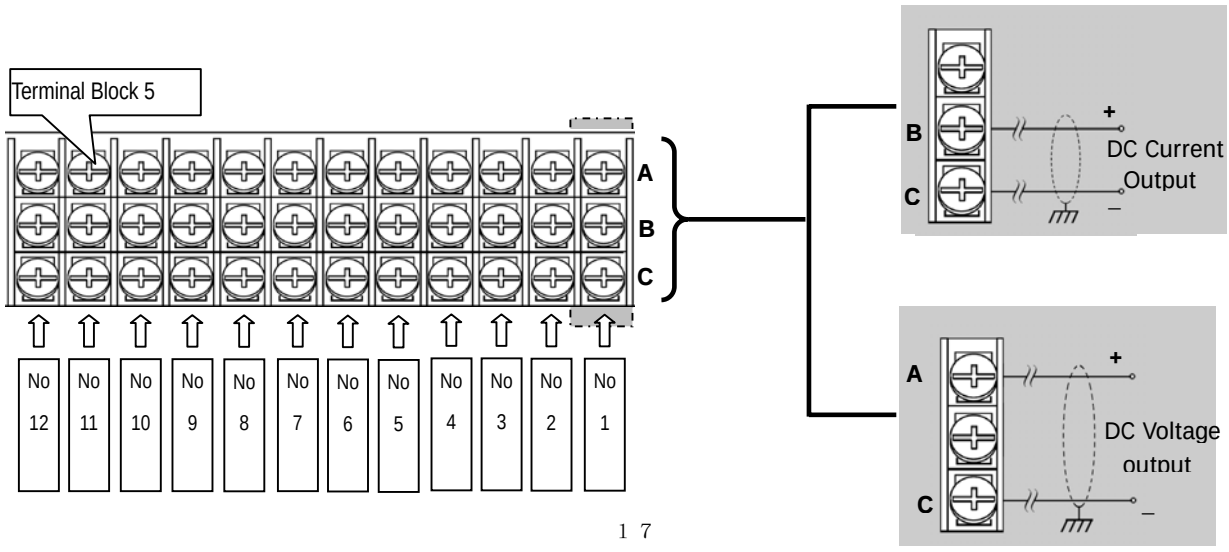



The standard R300T200 provides maximum 16 universal input channels. Special model provides maximum 32 universal input channels.

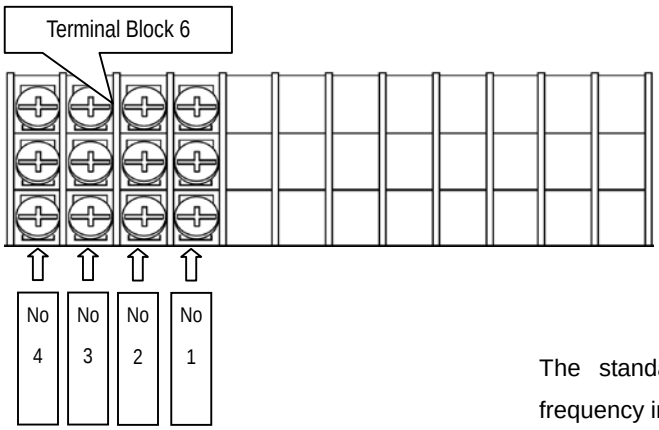
Following is the signal input example of No. 1 channel connection. Other connections are the same.

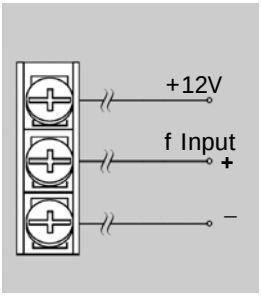



## ✧ Analog Output Wiring



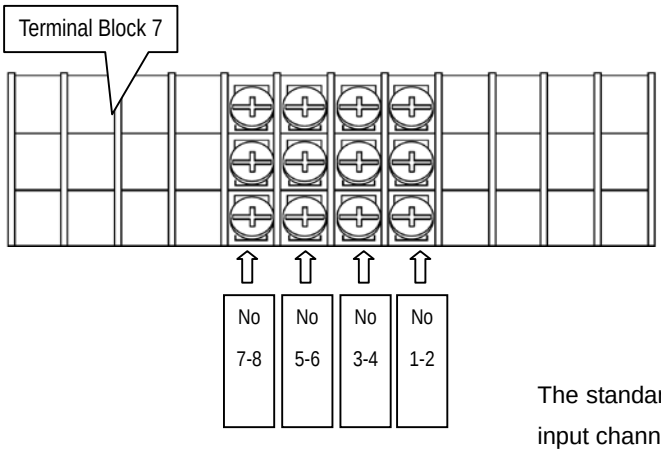
## ✧ Frequency Input Wiring

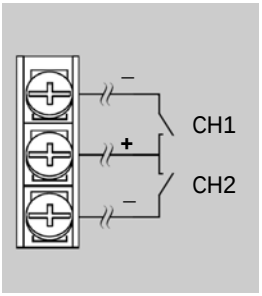



The standard R300T200 provides maximum 4 frequency input channels.

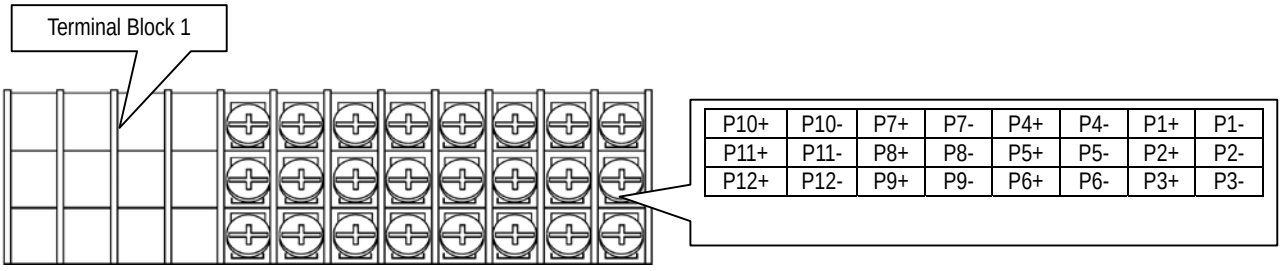
## ✧ Digital Input Wiring

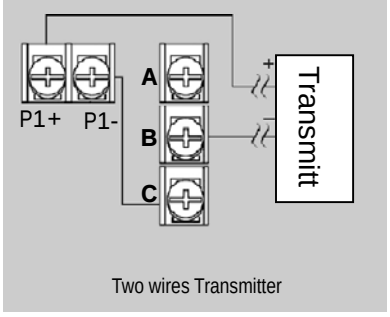


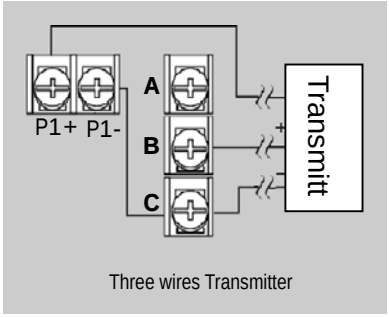



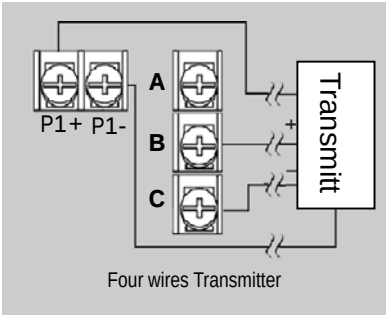

The standard R300T200 provides maximum 8 digital input channels.

## ✧ DC24V Sourcing Output



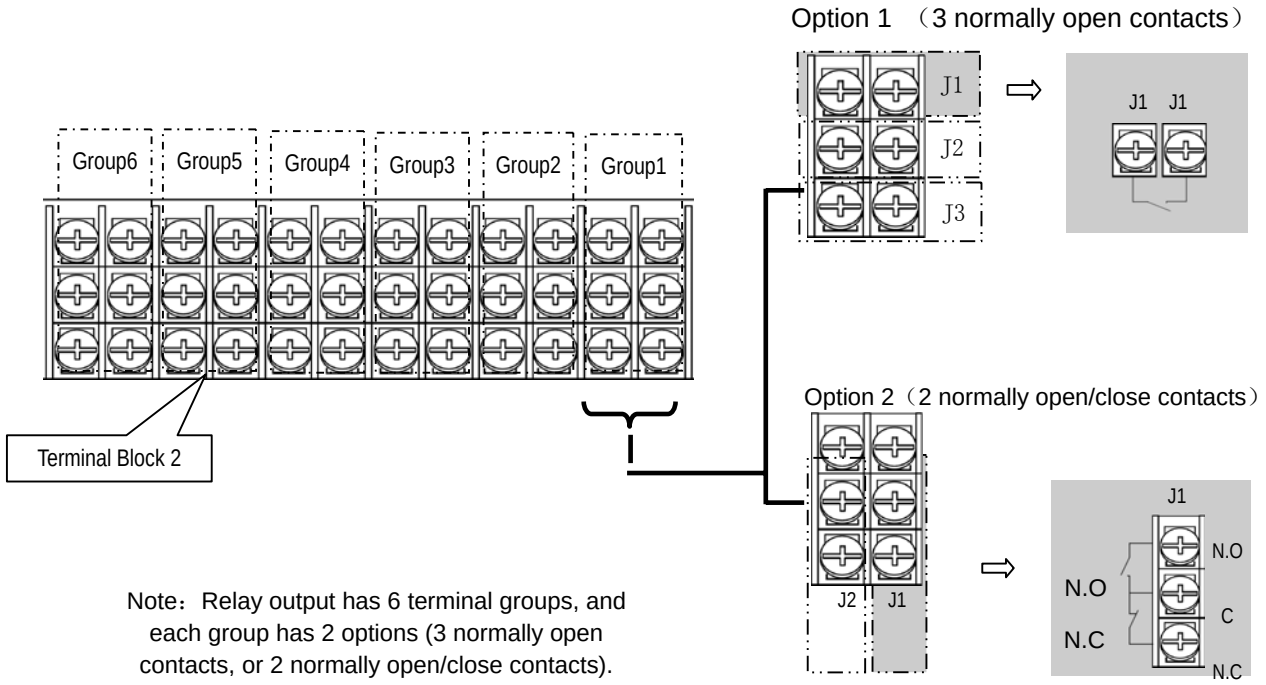




Note：Provided maximum 12 channels of DC 24V/25mA isolated current limited output. If need high current capacity, please indicate with you order.

✧ Relay Output Wiring




Note：Relay output has 6 terminal groups, and each group has 2 options (3 normally open contacts, or 2 normally open/close contacts).

## 4.2.3 COMMUNICATION WIRING

✧ **Communication RS-232Wiring**

For Communication wiring, it is recommended to use a shielding twisted wire, Cable length is a maximum of 10M

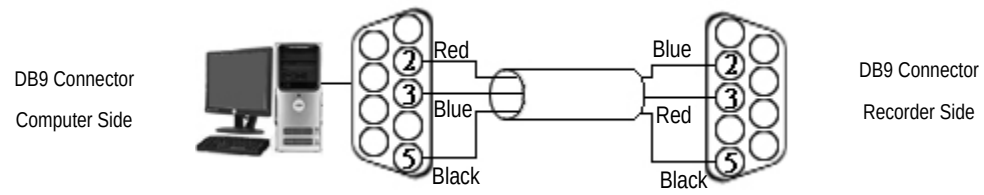



FIG 4-2-1 Computer and R300T RS-232 Wiring

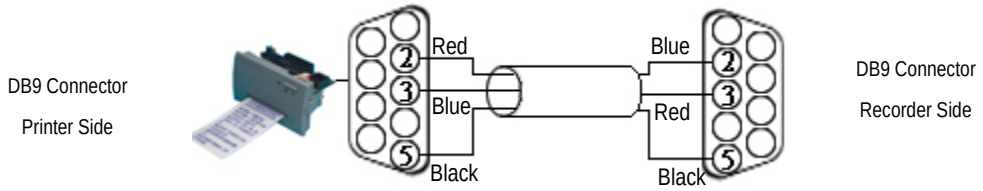



FIG4-2-2 Printer and R300T RS-232 Wiring

## ✧ Communication RS-485Wiring

It is recommended to use a shielding twisted wire; Cable length is a maximum of 1000M. To reduce reflection and noise , be sure to attach terminating resistance ( Rt 120Ω ) to a terminal side(FIG 3-3-7)

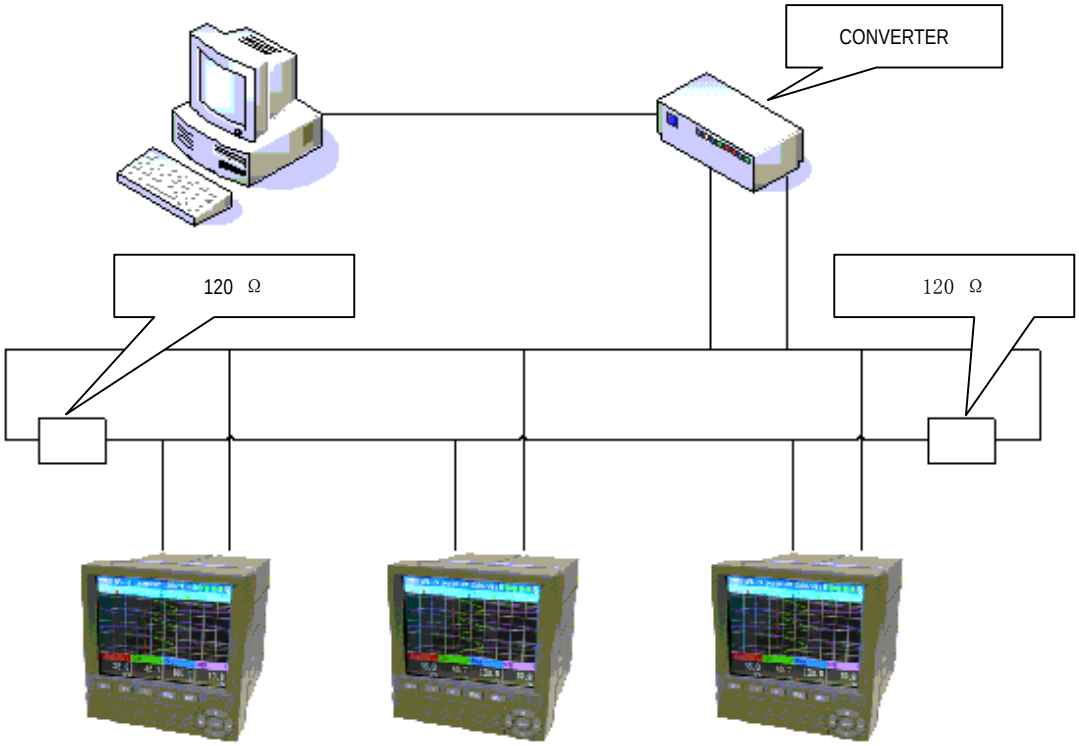



FIG. 4-2-3 RS-485NET

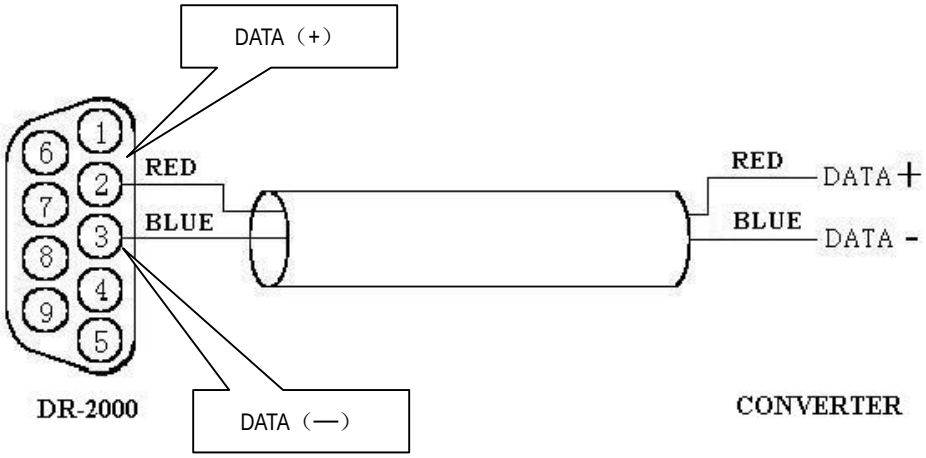



FIG. 4-2-4 RS232 and RS485 CONVERT

# SECTION 2 DISPLAY AND OPERATION

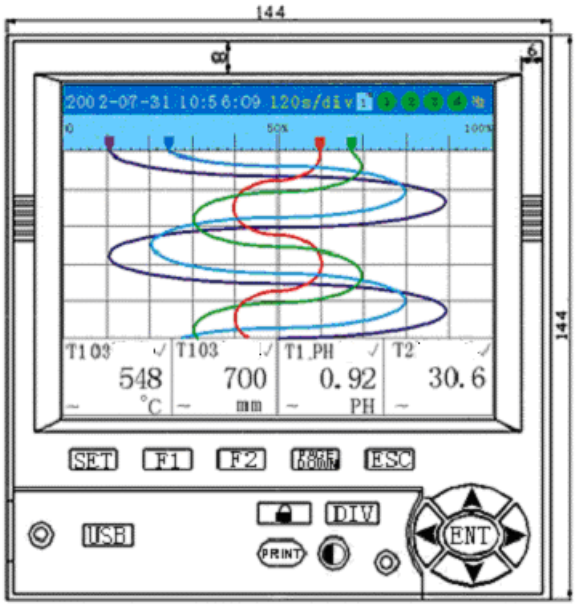
## CHAPTER 1 OPERATION INTRODUCTION

### 1.1 DISPLAY INTRODUCTION

✧ Power Up

The power cord will hookup to N, L terminal on the rear panel. The G terminal should be protective grounded for safety.

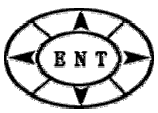
Check the details on the nameplate; make sure that the voltage of power supply satisfied with the instrument required.(generally wide range supply with 90~220V AC, 50/60Hz,unless special ordered) It is suggested that at first time of power up, do not reply any input signals to the recorder. After power up 8 system will show the initial screen and start the initialization,( as show on FIG.II 1-1-1), Press “ESC” key (or no key pressing, waiting for 3 second) ,the recorder will enter the main operation screen.




FIGII.1-1-1

### 1.2 ONPAD Keys Operation

Instrument Operation keypad as shown on FIG.II 1-1-1，total 14 function key.




“◀”、“▶” Key used for moving the cursor forward, backward.

“▲”、“▼” Key used for parameters changing.

“ ENT ” Key used for confirming function.

ESC "ESC" Key used for returning from the present operating function or present operating window.

DIV On the Main Screen and Historical Trend Screen, "DIV" Key used for change the Division. Total 4 divisions can be changed circularly and displayed different size compressed curves.

"SCREEN LOCK" Key used for locking the screen changes. When the screen is locked, a small lock symbol will display on the up-right corner of screen. If the screen is unlocked and no key operations within 4 minutes, the screen will be changed to the Main Screen. (expect on the Recent Alarm Screen)

On any screen, pressing "▲", "CONTRAST" Key, the Contrast Adjusting Window will be pop-up on the screen, total 30 steps for contrast adjustment. Pressing " ▼ " Key will increase the contrast of LCD screen, Pressing "▼ " Key will decrease the contrast of LCD screen, Pressing "ESC" Key will return to the original screen.

PRINT On any screen, pressing "PRINT" Key, the Printing Window will be pop-up on the screen.

SET Pressing "SET" and "▶ " at the same time, entering the instrument Configuration Setting Screen. On any screen, pressing "SET" and "ENT" at the same time, entering the Parameters, corresponding to the recent screen, Configuration Setting Screen.

F 1 "F 1"Used for some special key function, or combined with the other keys to do some special functions, they will be explained on following sections.

F 2 "F 2"Used for some special key function, or combined with the other keys to do some special functions, they will be explained on following sections.

PAGE DOWN On the displayed screen, Pressing "PAGE DOWN" Key will change to the Forward Screen, Pressing "F 1" and "PAGE DOWN" Key together, will change to the Backward Screen.

## 1.3 Special Keys Function

Following Function Keys and Combination Key will be affective on any screen:

| | |
|---|---|
| "SET"+"▶ " | Entering the instrument Configuration Setting Screen; |
| "F1"+"▶" | Entering the instrument layout and Connection Display; |
| "CONTRAST" | Open Contrast Adjusting Window. |
| "SET"+" ◐ " | Display Help Screen; |
| "F1"+"PRINT" | Printout Current Real-Time Data |

# CHAPTER 2 SCREEN DISPLAY

**R300T Series** Color Paperless Recorder combines the screens as follows:
Starting Screen
Connection Screen
Main Screen : Real-Time Multi-Channel Display
Real-Time Alarm Display,
Dual Channel Display
Full Channel Display
Alarm Overview Display
Bar-Graph Display
Historical Trend
Several Configuration Screens
Parameter Setting Screens with English/Chinese manual.

## **2.1** MAIN SCREEN- REAL-TIME MULTIFUNCTION DISPLAY

After the recorder is powered on, the Main Screen will be automatically displayed as Opened–Real-Time Multi-Channel Display Screen, as shown on FIG.II 2-1-1.
On the top of the Main Screen, there is a display include:
System time and relay output conditions, communication status, division value, and recent display group number.
The recorder display is divided into 6 groups, each group includes up to 4 channels. Main Screen will display Tag Number, Error mark, Unit, Display mark, Real-Time measuring data, sequel curve Recording pen Division of each channel of the recent group.

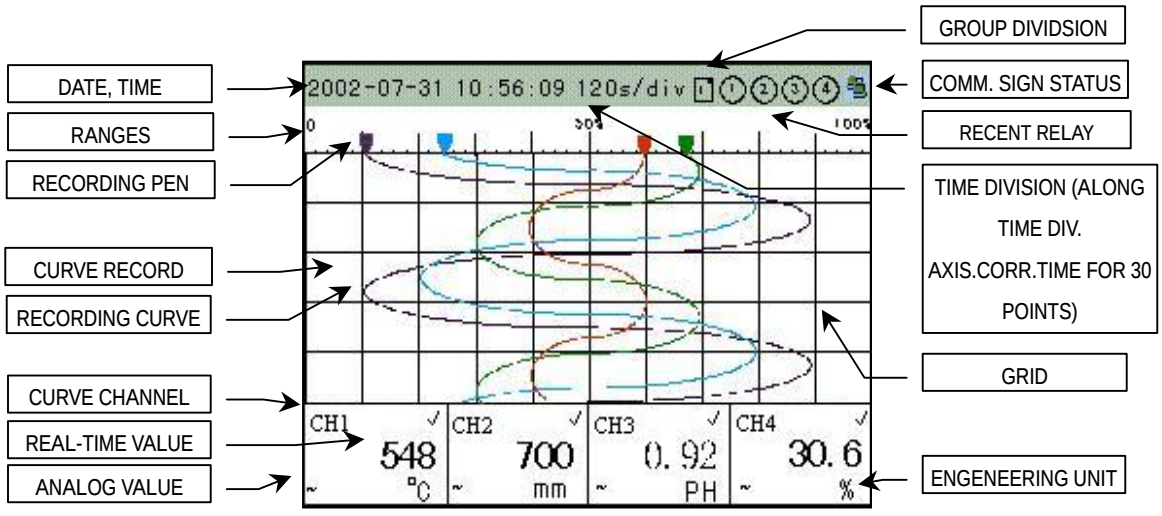
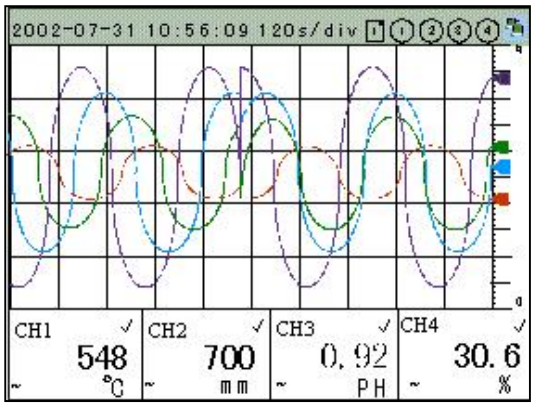
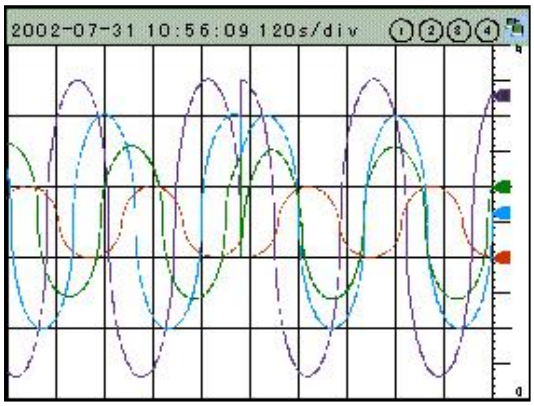



FIG.II 2-1-1

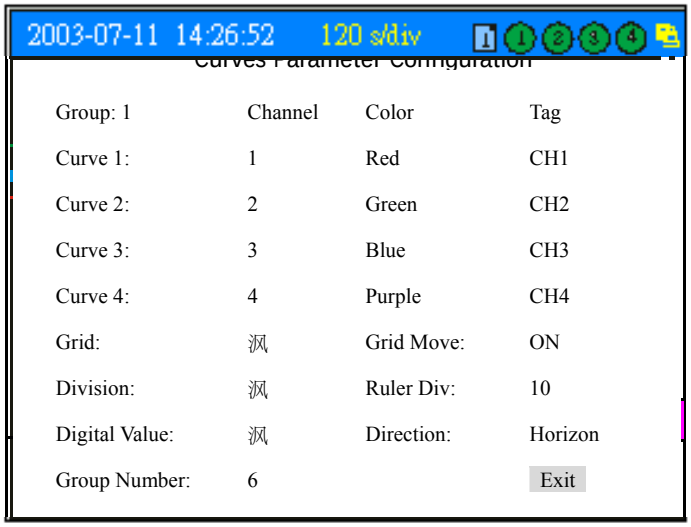
Recorder can display vertical curves (FIGII. 2-1-2) , also display horizontal curves (FIGII. 2-1-3) , as well as turnoff measuring data display to enlarge the area of curves display (FIG.II 2-1-3) . All the changes by pressing “SET”+“ENT” key，enter the parameter window related to the screen, (FIG.II 2-1-4) , and to achieve it by simple settings.




FIGII. 2-1-2




FIGII. 2-1-3


2003-07-11 14:26:52 120 s/div
Group: 1 Channel Color Tag
Curve 1: 1 Red CH1
Curve 2: 2 Green CH2
Curve 3: 3 Blue CH3
Curve 4: 4 Purple CH4
Grid: 汎 Grid Move: ON
Division: 汎 Ruler Div: 10
Digital Value: 汎 Direction: Horizon
Group Number: 6
Exit

FIGII. 2-1-4

✧ KEYPAD

| | |
|---|---|
| "DIVISION" | 4 divisions can be changed, displaying the curves in different sizes，Using "TIME DIVISION" parameter items in the "SYSTEM CONFIGURATION"，change one kind of selected rate. |
| "◀"、"▶" | Moving Curve， point the cursor to each display mark of the channel. |
| "▲"、"▼" | When cursor is pointed to the display mark of a channel, these two key can be used to display or hide the curves of this channel, through changing the display mark of channel. |
| "ESC" | Moving the cursor away from the display mark of any channel. |
| "F2" | Change display group, total 6 groups, each group displays 1 to 4 curves. |
| "F1"+"F2" | Turn on/off the function of automatic changing display group, when the automatic changing function is on, instrument will change to the next display group every 4 seconds automatically. |
| "PAGE DOWN" | Change to next screen. |
| "SET"+"ENT" | Entering curves parameter setting display screen. For all 6 group of display curves, |

configuring channel, color, grid/no grid, division, value, setting grid location, grid number, curve direction, and setting measuring group number.

## 2.2 Instant Alarms Display

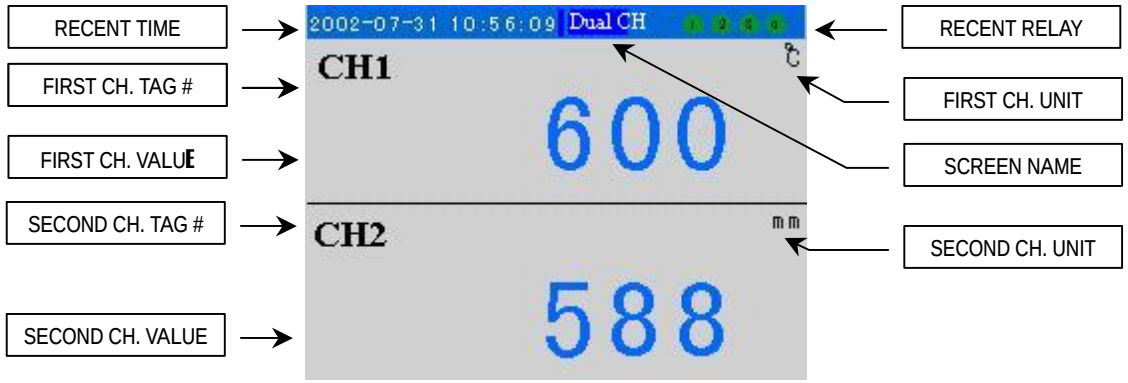
The screen (FIGII. 2-2-1) will display 4 alarm status of all measuring channels in one screen, it will be easy for operator to find the recent alarm channel and alarm type quickly. In the table which displays 4 alarm point of each channel, displaying "H" presents High Alarm Condition, displaying "L" presents Low Alarm Condition, no display presents no Alarm Condition. In the Recent Alarm Configuration, if the "AUTO CHANGE TO ALARM SCREEN" is ON, when alarm happen, it will change to the Recent Alarm Screen.

| Real -time Alarm | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CH** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** |
| **AL1** | | | | | | | | | | | | | | | | |
| **AL2** | | | | | | | | | | | | | | | | |
| **AL3** | | | **L** | **L** | **L** | | | | | | | | | | | |
| **AL4** | | | **L** | **L** | **L** | | | | | | | | | | | |

**FIGII 2-2-1**

## 2.3 Dual Channels Real-Time Digital Display

Dual Channel Digital Display Screen (FIGII 2-3-1) displays real-time measuring value of two channels with larger size letter. Therefore operator can easy observe and compare measuring values of the channels in distance. The operator, as required, select any two channels for observe.




FIGII. 2-3-1

✧ KEYPAD

"SCREEN LOCK" Lock function for screen change, after pressing the key "SCREEN LOCK SIGN" will display or disappear on the upper-right corner of the screen. If no sign display, after 4 minutes no any key operations, display screen will be changed to main, otherwise, the recent screen will be remained.

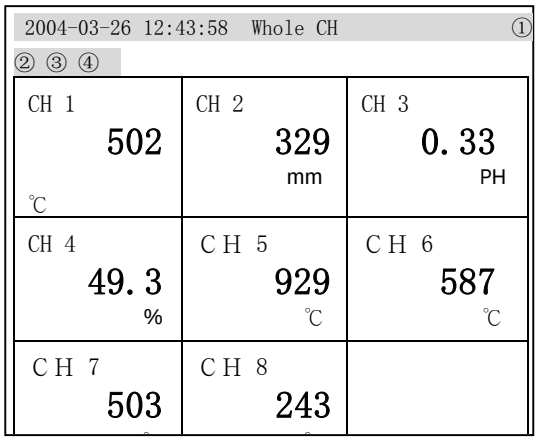
“◀”、“▶”
“▲”、“▼”

Moving curser, locate the curser to the Tag Number of each display channel.。
When the curser located on the Tag Number of certain channel, setting the channel display by operating these two keys.

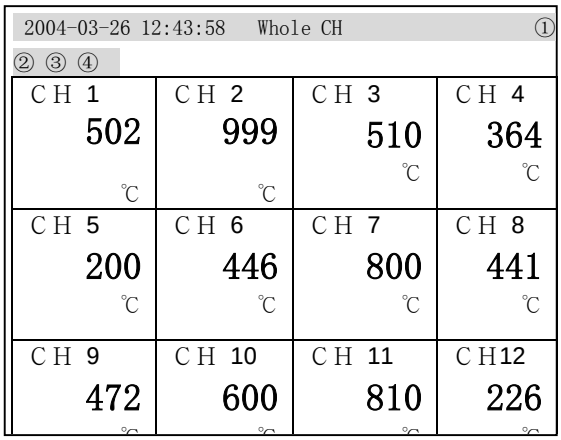
“ESC” Moving the curser away from the display mark of any channel.

## 2.4 Total Channel Real-Time Data Display

Full Channel Real-Time Data Display Screen is convenient for user to overview the real-time measuring data of all the using channels. (displayed when more than two channels are used) .The instrument corresponds to the recent total channel number setting, displays the real-time measuring data, engineering unit, and their Tag Numbers of all channels, automatically layout the screen with proper size of characters. As shown on FIG.II 2-4-1、FIGII.2-4-2，are the full channel display screens with 9 channels and 16 channels.

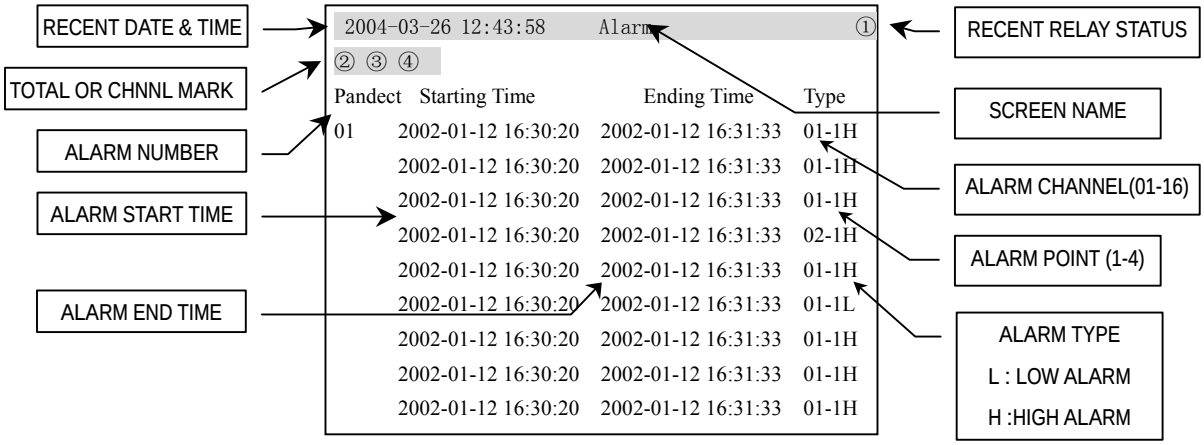



FIGII 2-4-1




FIGII 2-4-2

## 2.5 Alarm Summary Display




FIGII 2-5-1

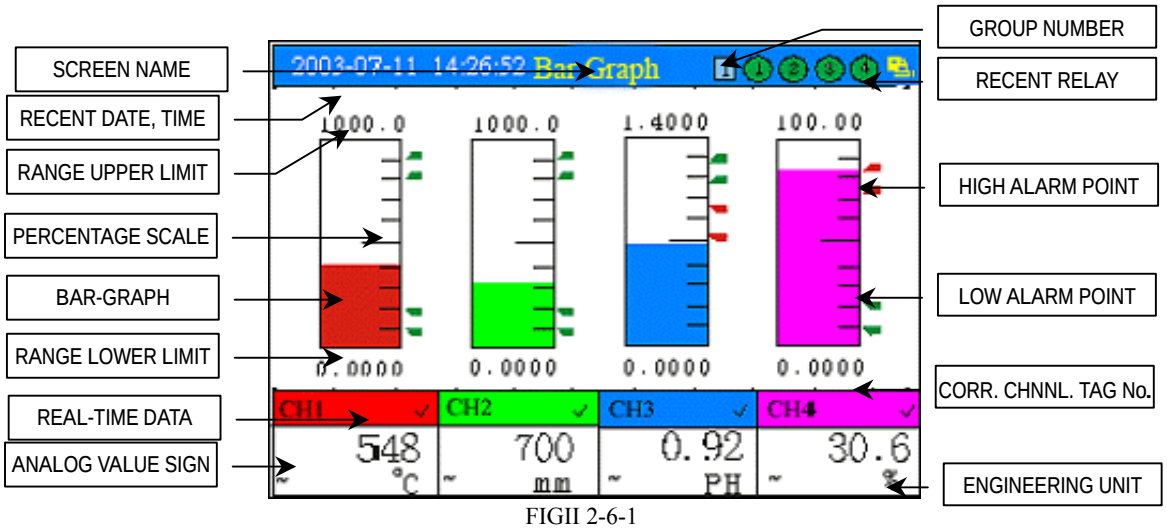
Alarm Historical Recording Overview Display Screen displays the latest 16 lines of alarm recording of the instrument, or the latest 16 lines of alarm recording of each channel. Every Record includes: Alarm Starting Time, Alarm Ending Time, Alarm Channel, Alarm Point, Alarm Type. As shown on FIGII. 2-5-1.

✧ KEYPAD

| KEYPAD | |
|---|---|
| "◀" 、"▶" | Moving Cursor，locates cursor to the different alarm recording. |
| "F2" | Change the displayed latest 16 records of each channel alarm record or Summary alarm record. |
| "F1"+"F2" | Change display (1-16) or (17-32) record of the alarm recording. |

## 2.6 Bar-Graph Chart Display

Bar-Graph Screen, separating into 6 groups, can display multi-channel bar-graphic picture, it is easy to directly observe multi-channel real-time situation. As shown on FIGII. 2-6-1 ，There are display of recent date, time, groups number and relay output status on the top of screen. The instrument corresponds to the recent total channel number setting，automatically layout the screen with proper size of Bar-Graphs. Inside the Bar-Graphs displays percentage scales, upper and lower side of Bar-Graphs displays the corresponding channel ranges，Right side of Bar-Graphs displays the alarm signs.(GREEN means normal，RED means alarm) ，Lower side of screen displays Tag Number, Measuring Values and Engineering Unit.




FIGII 2-6-1

✧ KEYPAD

| | |
|---|---|
| “F2” | Change display group，total 6 groups, every group display 1 - 4 curves. |
| “F1”+“F2” | ON/OFF automatic changing display group function, when automatic changing function is on, instrument automatically changes to next group display every 4 seconds. |
| “SET”+“ENT” | Enter Curve Display parameters setting screen. It can set corresponding channels, colors for the 6 groups’ Displaying Bar-Graph Screen. |

## 2.7 Historical Trend

Historical Recording Trend Screen is used for research of historical data. Its screen display is similar to the main screen, as shown on FIGII. 2-7-1, its picture display is similar to the main screen, shown as FIGII.2-7-1.The difference are, under the Real-Time time display line, it displays only the range of time interval of recent trend recording, and in the data display, it displays the high limit value and low limit value of measuring data during the interval. In the curves area, an additional dot line, which represents the position axis of trend recording, will use for marking the location of recent trend recording point.

There are three types of Trending Screens including Single Trend, Continuous Trend, and Timely Trend. They can be selected by pressing "NEXT PAGE" key to change the function mark on the lower right corner of screen. Different function marks means different function and keypad operation, they will be described respectfully as follow:

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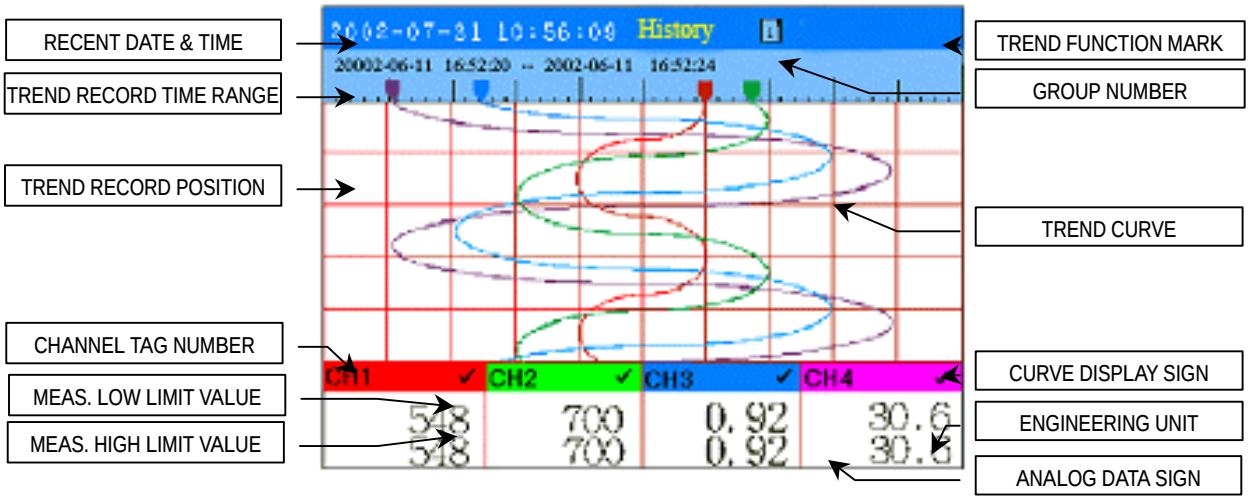



FIGII 2-7-1

### KEYPAD

"DIVISION" Change to 4 step division, the curves can be amplified or dwindled to different size, using "DIVISION SELECT" parameters of "SYSTEM CONFIGURATION" , change to a selected size.

"SET"+"ENT" Enter the screen of curves display parameter setting, For 6 group display curves, setting corresponding channels, color, grids display, scale, value, grid position, scale division and curves direction.

"◀" 、"▶" Moving cursor, locate cursor to the selected display mark of each display channel.

"▲" 、"▼" When cursor was located on the display mark of a channel, using these two key to adjust the display mark of the channel, it will display or hide the curves of the channel. When cursor was not located on any display mark of the channel, other trend operations can be done.

"ESC" Make the moving cursor not located on any display mark of the channel, the trend operations will be returned to display the recent relay status.

"F2" Change display group, total 6 groups, each group displays 1-4 curves.

"F1" Change trend functions, trend function displays in turn as: 4 relays output status, "SINGLE

TREND”、“CONTINUE TREND”、“TIMELY TREND”。The key functions of different trend function condition will explain as follow:

✧ RELAY STATUS

Key Function as above.

✧ SINGLE TREND

Trend curves or trend record position axis move one lattice forward or on lattice backward.

“ENT” Change the record trend position axis to solid line or dot line.

“◀” For horizontal curve, when position axis is dot line, curve moving left one lattice; when position axis is solid line, position axis moving left one lattice.

“▶” For horizontal curve, when position axis is dot line, curve moving right one lattice; when position axis is solid line, position axis moving right one lattice.

“▲” For vertical curve, when position axis is dot line, curve moving up one lattice; when position axis is solid line, position axis moving up one lattice.

“▼” For vertical curve, when position axis is dot line, curve moving down one lattice; when position axis is solid line, position axis moving down one lattice.

✧ **CONTINUOUS TREND**

After trend direction is confirmed, system will automatically move trend curve according to the pre-set interval.

“ESC” Quitting Continue Trend,

“◀” For horizontal curve, curve continually moves one lattice left. Function Indication becomes << 01.

“▶” For horizontal curve, curve continually moves one lattice right. Function Indication becomes >> 01.

“▲” For vertical curve, curve continually moves one lattice up. Function Indication becomes ⩓ 01 .

“▼” For vertical curve, curve continually moves one lattice down. Function Indication becomes ⩔ 01.

<< 01 、>> 01 、⩓ 01、⩔ 01

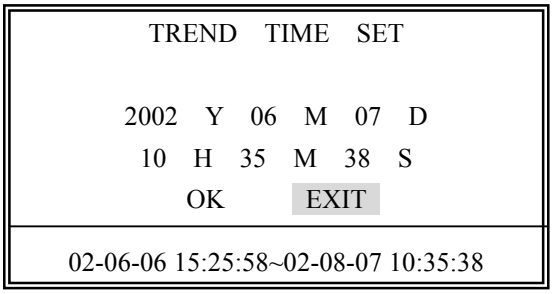
Continue Trend，“〈〈”means curve moved left，“〉〉” means curve moved right，“⩓” means curve moved up,“⩔” means curve moved down. Value means the lattice number on each moving, select 1 to 20 total 20 step by the key of “◀”、“▶” or “▲”、“▼”.

“ESC” Quitting Continue Trend,

**TIMELY TREND**

Enter trending time, then searching the historical recording point.

First, press “ENT” key，a trending time setting window will display on the screen, shown as follow:




FIGII.2-7-2

Use“◀”、“▶”keys moving cursor to the digits location of year, month, day, hour, minute and second. Use“▲”、“▼” key to modify the digits which cursor pointed, setting date and time of the searching historical data, then press “ENT” key to confirm. Now system will search the record according to the set date and time. If find, the curve position axis will be located to the searching point.

If not find, the setting window will return, and entering the new trending time will be required.

## 2.8 Instrument Design and Wiring Screen

In any screens, pressing"F1"+" ▶ " Key at the same time, the screen will change to Instrument Layout and Connection Display Screen. It can display the memory capacity, free space, recording starting time, channel number, recording interval, and calculating result of total possible recording time under the current setting condition. Displaying recent instrument connection screen will be convenient for the instrument maintenance person to understand the situation of instrument wire connections, to prevent the wrong insertion of circuit boards amount several instruments and cause the actual connections are different from the connection diagram of instrument terminals, as shown on FIGII. 2-8-1. This instrument has 4 channel Inputs, 5 channel DC24V powered outputs, 10 channel relay output.

Color Paperless Recorder Ver1.68-000000000

| | | | |
|---|---|---|---|
| Capacity | 128 M bit | Free Space | 99% |
| Channels | 4 | Record Interval | 4 Sec. |
| Recording Time | 32 D 17 H 04 M 00 S | | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| J10A | J10B | J7A | I7B | J4A | J4B | J1A | J1B | P5- | P4- | P1+ | P1- |
| | | J8A | J8B | J5A | J5B | J2A | J2B | P5+ | P4+ | P2+ | P2- |
| | | J9A | J9B | J6A | J6B | J3A | J3B | | | P3+ | P3- |
| | | | | | | | | RTD1 | RTD1 | RTD1 | RTD1 |
| | | | | | | | | RTD2 | RTD2 | RTD2 | RTD2 |
| | | | | | | | | | ⏚ | ⏚ | ⏚ |

FIGII. 2-8-1

✧ KEYPAD

"ESC" Return to main screen.

# SECTION 3 DISPLAY AND OPERATION

## CHAPTER 1 CONFIGURATION

**T300R** Paperless Recorder uses complete English/Chinese characters and styles to set up the parameters configuration of the instrument, with friendly interfacing between human and machine, operators will be able to handle the parameter configuration settings in very short time.

### 1.1 Operation Introduction

✧ Enter Configuration Screen

In any screen, pressing "SET" + "▶" Key at the same time, entering configuration screen.

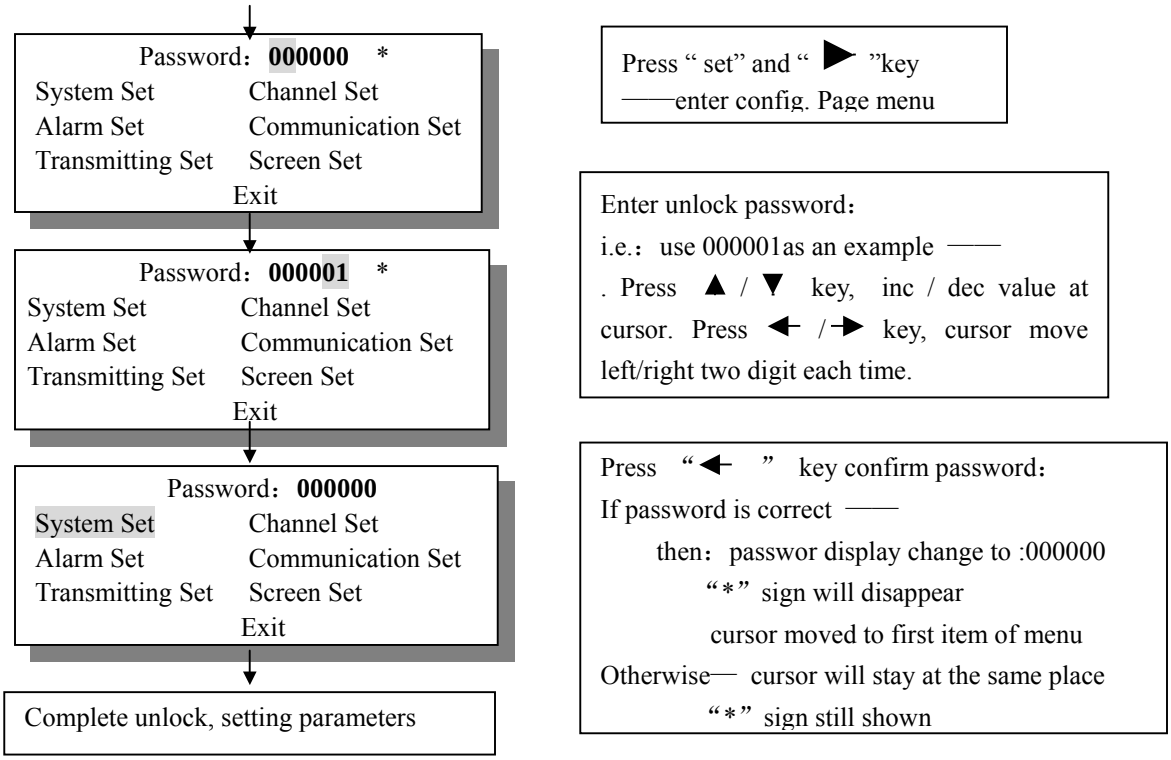
✧ Moving Cursor

In the configuration screen, pressing "◀" Key, it will move cursor forwards, Pressing "▶" Key moves cursor backwards.

✧ Confirm Operation

In the configuration screen, pressing "ENT" Key, It will confirm the function.

✧ Instrument Unlock


Password: 000000 *
System Set Channel Set
Alarm Set Communication Set
Transmitting Set Screen Set
Exit
Password: 000001 *
System Set Channel Set
Alarm Set Communication Set
Transmitting Set Screen Set
Exit
Password: 000000
System Set Channel Set
Alarm Set Communication Set
Transmitting Set Screen Set
Exit
Complete unlock, setting parameters
Press " set" and " ▶ "key
——enter config. Page menu
Enter unlock password:
i.e.: use 000001as an example ——
. Press ▲ / ▼ key, inc / dec value at cursor. Press ◀ / ▶ key, cursor move left/right two digit each time.
Press " ◀ " key confirm password:
If password is correct ——
then: passwor display change to :000000
"*" sign will disappear
cursor moved to first item of menu
Otherwise— cursor will stay at the same place
"*" sign still shown

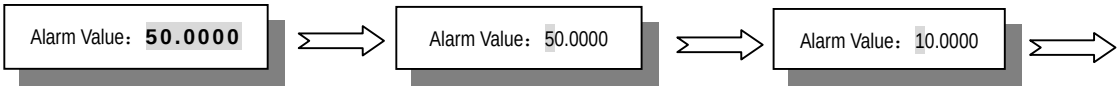
✧ Modify Data (Unlocked)

In the Parameter Configuration，There two way to modify the value, shown as following:

No.1：Press ▲/▼ key modifying value or selecting new item.

No.2：Setting at each digit (only affect to floating point value) —— An example shows that changing alarm

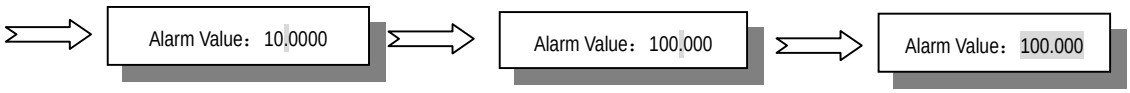
set point from“50”to“100”.




Moving cursor to modify parameter place, press “ENT” key for parameter.

Press cursor left key or right key, move to modify param. Value, i.e.

Press Down Key until param. Value equal to 1.

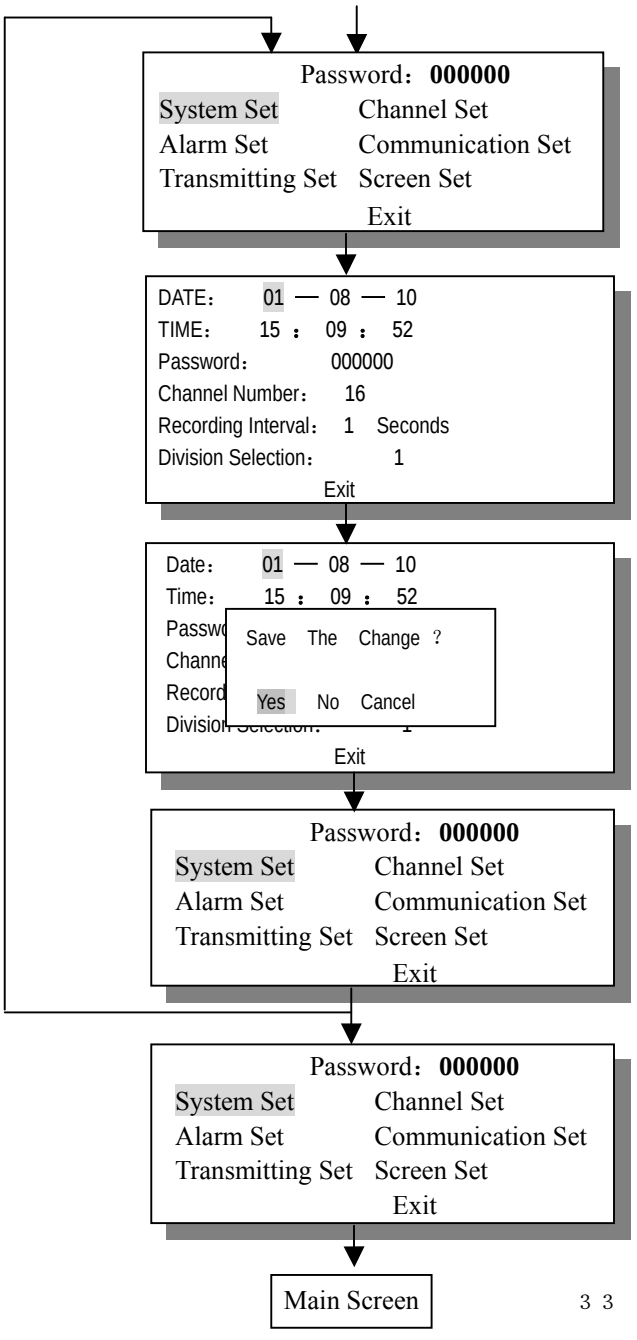



Press Moving Key, move cursor to the decimal point

Press Reduce Key, move decimal point location, let display value as 100.000.

Press “ENT” Key, confirm setting param. value and move out

## ✧ Configuration (Unlocked)




Press “ Ent” enter screen with param.

Parameter modification：
. Use ◀ / ▶ move cursor
. Use▲ / ▼ modify each digit

Escape this modify Page：
. Move Cursor to “ESC”
. Press “ENT” Key
. Or press “ESC” Key directly

Dialog Window pop up on the Screen
Move cursor to select one item
Press “ENT” Key to confirm and return
[Note]
“YES”： Keep modification Value,
“NO”： Not save

Press ◀ / ▶ Key Move Cursor
Select one operation

Move Cursor to “ESCAPE CONFIG.”. Press “ENT” Key, and return to measuring display screen

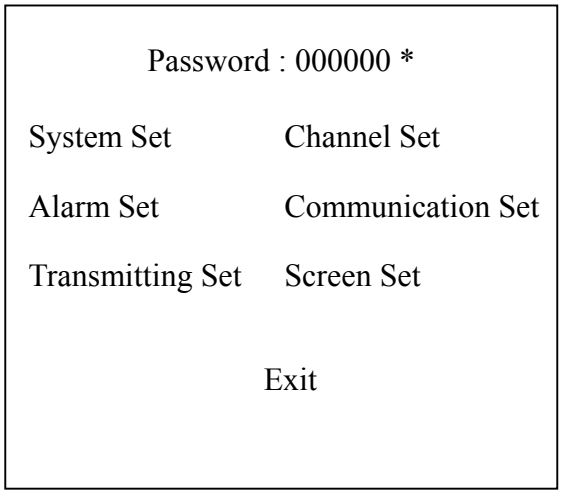
# CHAPTER 2 CONFIGURATION AND PARAMETERS

## 2.1 Introduction

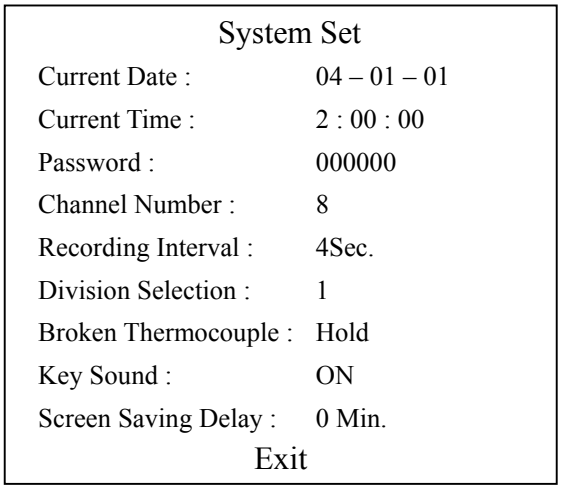
Instrument Configuration Menu are total six items, Including：System Configuration、Channel Configuration、Alarm Configuration、Communication Configuration、Transmitting Configuration and System configuration, They will be explained separately as follow:

## 2.2 System Configuration

System Configuration Screen Shown as FIGIII. 2-2-1，used for the configurations of Date, Time, Password, Channel Number, Recording Interval, Broken Thermocouple Handling, Keypad Sound、Delay Screen Saver.




FIGIII. 2-2-1


System Set
Current Date : 04 – 01 – 01
Current Time : 2 : 00 : 00
Password : 000000
Channel Number : 8
Recording Interval : 4Sec.
Division Selection : 1
Broken Thermocouple : Hold
Key Sound : ON
Screen Saving Delay : 0 Min.
Exit

FIGIII. 2-2-2

| NAME | RANGE | DESCRIPTION | MANUF.PRE -SET VALUE |
|---|---|---|---|
| Current Date | YEAR - MONTH - DAY | DATE SETTIONG | REAL-TIME |
| Current Time | HOUR : MINUTE : SECOND | TIME SETTING | REAL-TIME |
| Password | 000000 ~ 999999 | PARAMETER SETTING PASSWORD (CONFIGURATION UNLOCK ASSWORD) | 000000 |
| Channel Number | 1 ~ 16 | SETTING CHANNELS TO BE RECORDED | REAL VALUE |
| Recording Interval | 1 ~ 240 | SETTING RECORDING INTERVAL | 4 SECOND |
| Division Selection | 1 ~ 4 TYPE | 1 TYPE : DIVISION CHANGED AS 1, 2, 4, 8<br>2 TYPE : DIVISION CHANGED AS 1, 2, 8, 16<br>3 TYPE : DIVISION CHANGED AS 1, 4, 8, 24<br>4 TYPE : DIVISION CHANGED AS 1, 4, 16, 48 | 1TYPE |
| Broken Thermocouple | HOLD<br>MOVE TO BEGIN<br>MOVE TO END | HOLD：KEEP RECENT DATA UNCHANGED<br>MOVE TO BEGIN :DISPLAY LOW LIMIT VALUE<br>MOVE TO END：DISPLAY HIGH LIMIT VALUE | MOVE TO END |
| Key Sound | ON/OFF | ON : WHEN PRESS KEY，BUZZER ONE SHORT SOUND<br>OFF : WHEN PRESS KEY，BUZZER NO SOUND | ON |
| Screen Saving Delay | 0 ~ 240 MINUTES | 0 : No SCREEN SAVING FUNCTION;<br>1~99 : WITH SETTING MINUTES, IF NO KEY PRESSED, LCD DISPLAY WILL BE SHUTDWN TO EXTEND LCD SCREENLIFE, PRESS ANY KEY, THE SCREEN DISPLAY WILL BE RETURNED. | 0 |

FIGIII. 2-2-3

## 2.3 Channel Configuration

Channel Configuration as FIGIII.2-3-1 shown，use to configuration setting of input values.

Channel Configuration

Channel : 1 Type : 4-20mA

Tag: CH1

Range : 0.0000~1000.0

Filter : 0.0

Unit : mA Decimal Point: 0

Ingnored Value : 0.0%

Square Root : YES Detection : YES

AdjustZero Value : 0.0000

Adjust Propoation Value : 1.0000

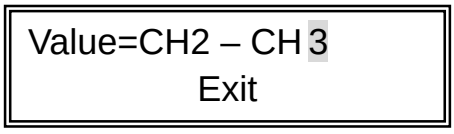
EXIT

FIGIII. 2-3-1

| NAME | RANGE | DESCRIPTION | MANUF.PRE-SET VALUE |
|---|---|---|---|
| Channel | 1 ~ 16 | Select CH. No. corresponding. setting Parameters | REAL-TIME VALUE |
| Type | RTD, THERMOCOUPLE, FREQUENCY, II, III TYPE STANDRD SIGNAL, | Instrument Input Signal type (Special Requirement, Please explain) | REAL-TIME VALUE |
| TAG | PRE-SET/Character… | Setting and displaying Tag# by defining, entering English/Chinese characters and symbols，Manufacturer pre-set as ”Ch.1” - “Ch.16” | PRE-SET |
| Range | -9999 ~ 99999 | Setting High Limit and Low Limit of the collected signal ranges | 0.000 - 1000.0 |
| Filter | 0 ~ 9 | Used for improving anti-interference of signal processing | 0(NO FILTER) |
| Unit | SEE”ENGINEERING UNIT”TABLE | Engineering Unit of None-Flow Real-Time Display Value | ℃ |
| Decimal Point | 0 ~ 3 | Number of Decimal Point of Display Value | 1 |
| Ignored | 0 ~ 25.5% | Used for cutting off ignored small signal in measuring, Setting the percentage of data corresponding range. | 0 |
| Square Root | YES/NO | Used for Input Signals need Square Root Calculation | NO |
| Detection | YES/NO | Select if masking detection signal of this channel | YES |
| Adjust Zero Value | -9999 ~ 99999 | Adjust Zero Value of the Input Signal | 0.0000 |
| Adjust Proportion Value | -9999 ~ 99999 | Adjust Proportional Value of the Input Signal | 1.0000 |

FIG. 6-2-2

[ NOTE 1 ]：In the Type configuration, if the adopter board channel is Full Cut-able, then all the Thermocouple, RTD, II, III type standard signal can be selected ; if using the frequency adopting channel, then only frequency item can be selected ; if using none Full Cut-able fixed signal input, then only corresponding signal type can be selected; If using Thermocouple as input, only T, S, K, J, E, B, W7 type can be selected; if there are no corresponding hardware adopting circuit for the channel, select type as “CALCULATION” with some special process. When type “Calculation…” is selected, press “ENT” Key，a small window will be pop-up from screen, shown on the right, the data used for setting this channel are gotten by the calculation (+ 、- 、* 、/) of data from other channels. Using this function to process some special application (i.e. calculating the water level difference between two places, calculating the heat energies difference between inlet and outlet to obtain the heat value loss, etc.) After setting the calculating channel and calculation symbols, the cursor can be pointed to “ESCAPE”，then press “ENT” key to escape.



✧ Additional: Table of Engineering

| ENGINEERING UNIT TYPE | ENGINEERING UNIT SYMBOLS |
|---|---|
| TEMPERATURE | ℃ ℉ |
| PRESSURE | kgf/cm² Pa kPa Mpa mmHg mHg $mmH_2O$ $mH_2O$ bar mbar atm |
| FLOW | t/h t/min t/s L/h L/min L/s Kg/h Kg/min Kg/s<br>m³/h m³/min m³/s $Km^3/s$ $Km^3/min$ $Km^3/s$ $Nm^3/h$ $Nm^3/min$ $Nm^3/s$ |
| WEIGHT | t kg g |
| VOLUME | Nm³ m³ cm³ L mL KL $mm^3$ |
| HEAT ENERGY | KJ/h KJ/min KJ/s J KJ MJ GJ GJ/h MJ/h |
| ELECTRICITY | V KV A KA W KW MW mA Mv WH KWH |
| ROTATION SPEED | r/min |
| DESITY | PH PPM |
| DISTANCE | M mm Wm cm Km |
| OTHERS | Hz KHz % ‰ us/cm KN CRN CRV PPB %RH $\%O_2$ |
| SPECIAL REQUIRED | PLEASE NOTICE WHEN YOU ORDER |

## 2.4 Alarm Configuration

Alarm Configuration Screen configures the alarm parameters of each Channel, including alarm type, alarm set point, contact setting, dead band value, sound output and some other special settings. As shown on FIG.III 2-4-1，Each channel has mutual independent parameters, every channel can be configured to 4 alarms, and the alarm types, it make 4 upper limit alarms and 4 lower limit alarms to meet different field application settings. Other special settings are affective for all channel, they only need to set once in a channel. Each parameter will explained in the table below：

Alarm Configuration

Channel：1 Range：0.0000~1000.0 ℃

| No | Type | Value | Warp | Out | Sound |
|---|---|---|---|---|---|
| AL1 | H | 900.0 | 2.0000 | J1 | OFF |
| AL2 | H | 800.0 | 2.0000 | Null | ON |
| AL3 | L | 200.0 | 2.0000 | Null | OFF |
| AL4 | L | 100.0 | 2.0000 | J4 | ON |

Outside Contact：Null Display Switch：OFF

Output Delay：1 Second

Exit

FIGIII. 2-4-1

| NAME | SETTING RANGE | DESCRIPTION | MANUFACTURE PRE-SET |
|---|---|---|---|
| Channel | 1 —— 16 | INPUT CHANNEL OF THE CORRESPONDING ALARM VALUE (MARKED ON THE UPPER LEFT CORNER OF | REAL VALUE |
| Range | 0.0000——1000.0 | DISPLAY RANGE (DEPENDS ON ”RANGE SETTING” OF “CHANNEL CONFIGURATION” SECTION) | REAL-TIME VALUE |
| Type | H、L | H：HIGH ALARM L：LOW ALARM | REAL-TIME VALUE |
| Value | -9999 —— 99999 | SETTING EACH ALARM SET POINT | MANUFACTURE PRESET VALUE |
| Warp | -9999 —— 99999 | SETTING EACH ALARM DEADBAND | MANUFACTURE PRESET VALUE |
| Out | HIDE、OUTPUT | EACH ALARM MIGHT ACTIVATEONE OUTPUT RELAY. THE RELAY OUTPUT CAN BE ENABLED OR DISABLEDIN AT THE ALARM CONDITION. NOTE: RELAY CONTACTS ARE NORMALLY OPEN, CAN BE REPEATLY USED FOR EACH CHANNEL.<br>HIDE – MEANS ALARM BE RECORDED BUTNO RELAY OUTPUT | HIDE |
| Sound | ON、OFF | IF “ON”, WHEN IN ALARM CONDITION BUZZER SOUNDS.PRESS ANY KEY TO SILENCE. | OFF |
| Display Switch | ON、OFF | ON/OFF FUNCTION OF CHANGE TO ALARM DISPLAY SCREEN WHEN ALARM HAPPENS | OFF |
| Outside Contact | NONE、1、2、3、4 | WHEN THE FIELD NOISE IS HIGH, THE LOUDER ALARM BUZZER WILL BE NEEDED. IT WILL SELECT ONE CONTACT OF THE FOUR ALARM RELAYS AS EXTERNAL ALARM HORN OUTPUT. WHEN ALARM, THE SELECTED RELAY WILL BE ON. PRESSING ANY KEY WILL CANCEL | NONE |
| Output Delay | 0~7 Second | WHEN IN THE ALARM CONDITION，THE ALARM WILL BE ENABLED AFTER THE SET DELAY TIME, THEN RECORD AND PROCESS ALARM, IT WILL PREVENT THE MALFUNCTION ALARM BY INTERFERENCE. | 1 Second |

## 2.5 Communication Configuration

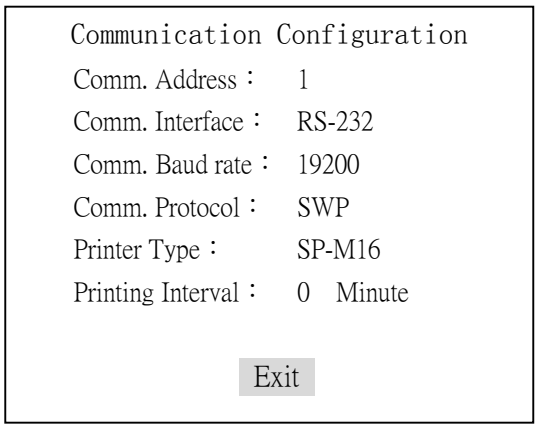
“Communication Configuration”, the screen used to configure the communication parameters, shown as FIGIII.2-5-1. Including the relative parameters communicated with the higher level peripheral: Instrument node address, communication type, communication Baud Rate, communication protocol, and the relative parameters of printer port: Communication Baud Rate (common settings of communication with higher level peripheral, the fixed of communication type RS-232, explaining the printer port when ordering), printing interval, printer type. The corresponding parameters will be shown on the table below:

| NAME | SETTING RANGE | DESCRIPTION | MANUF. PRE-SET |
|---|---|---|---|
| Comm. Address | 001 - 200 | THIS INSTRUMENT MANUFACTUREER MAILING ADDRESS | 001 |
| Comm. Interface | RS-232Cor RS-485 | SELECT COMMUNICATION METHOD | RS-232C |
| Comm. Baud rate (bps) | 1200, 2400, 4800, 9600, 19200, 38400, 57600 | SELECT DATA TRANSMIT SPEED | 9600 |
| Comm. Protocol | SR_BUS 或 MODBUS | SELECT SR_BUS INSTRUMENT PROTOCOL OR MODBUS_RTU PROTOCOL | SR_BUS |
| Printing Interval | 0-240 MINUTES | SETTING THE TIME INTERVAL OF TIMELY PRINTING (0：NO PRINT) | 0 |
| Printer Type | SP-M16, SP-T16, SP-M24, SP-T24, SP-M40, SP-T40, LQ-300K | SETTING SELEC TED PRINTER TYPE | REAL VALUE |

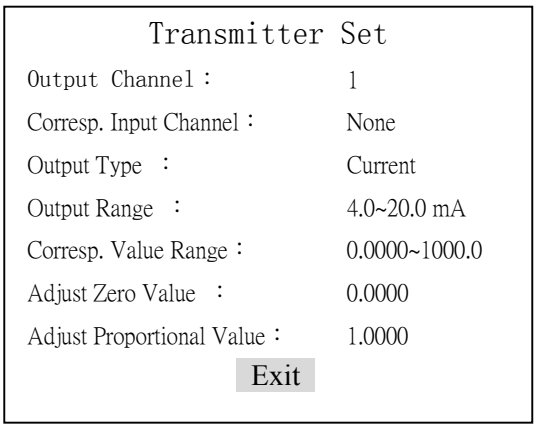
FIGIII. 2-5-1

[NOTE1] If using optical isolation electrically on the communication port and instrument (manufacture original setting), the reliable communication maximum baud rate is 19200bps. The communication port on the side of instrument is TTL electric signal with non-optic isolation, the communication maximum baud rate is 57600bps.

[NOTE2] For the micro-printers from different manufacturer, as long as it commands are compatible to ESC control code set, the correspondent compatible printer can be selected. Where: M present panel type printer, T present desktop printer, 16, 24, 40 separately present the printer types with width as 16 characters/line, 24 characters/line, 40 characters/line.




FIGIII. 2-5-2




FIGIII. 2-5-3

## 2.6 Transmitting Configuration

"TRANSMIT CONFIGURATION" screen used configuration of transmitting channel parameter, shown as FIG.III 2-6-1. Through configuration, the adopting calculation value or instant flow value (corresponding to flow value) of a channel can be transmitted in current or voltage signals. If instrument doesn't carry transmitting output board, this screen can not be entered. Corresponding parameters will explain as follow:

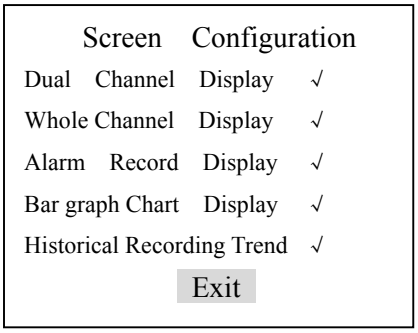
| NAME | SETTING RANGE | DESCRIPTION | PRE-SET VALUE |
|---|---|---|---|
| Output Channel | 1 ~ 8 | Select Transmit Channel Number required setting | Real-Time Value |
| Output Type | Voltage/Current | Setting Transmit Signal Type | Real-Time Value |
| Corresp. Input Channel | None, 1 ~ 16 | Setting Input Channel correspond to Transmit Output, "NONE" as no output | None |
| Output Range | 0 ~20 (mA) or 0 ~ 5 (V) | Setting Transmit Output Range (Any selections inside the Setting Range i.e. 2-3V or 0-10mA) | Real-Time Value |
| Corresp. Value Range | Adopt Value, Instant Flow, Instant Heat Energy | Setting Type corresponding Value of Transmitting Output | Adopting Value |
| Adjust Zero Value | Full Range | Corrective Zero of Transmit Output | 0.0000 |
| Adjust Proportional Value | Full Range | Corrective Proportion of Transmit Output | 1.0000 |

FIGIII. 2-6-1

[ NOTE ] Actual Output Signal = Transmit Output Value* Correct Proportion Value + Correct Zero Value

## 2.7 Screen Configuration

In Screen Configuration, when setting the circulating display screen for instrument to monitoring process, the not required screens can be hided. As shown on FIGIII. 2-7-1. Where，"√"means this screen will display，"×"means this screen will not display.



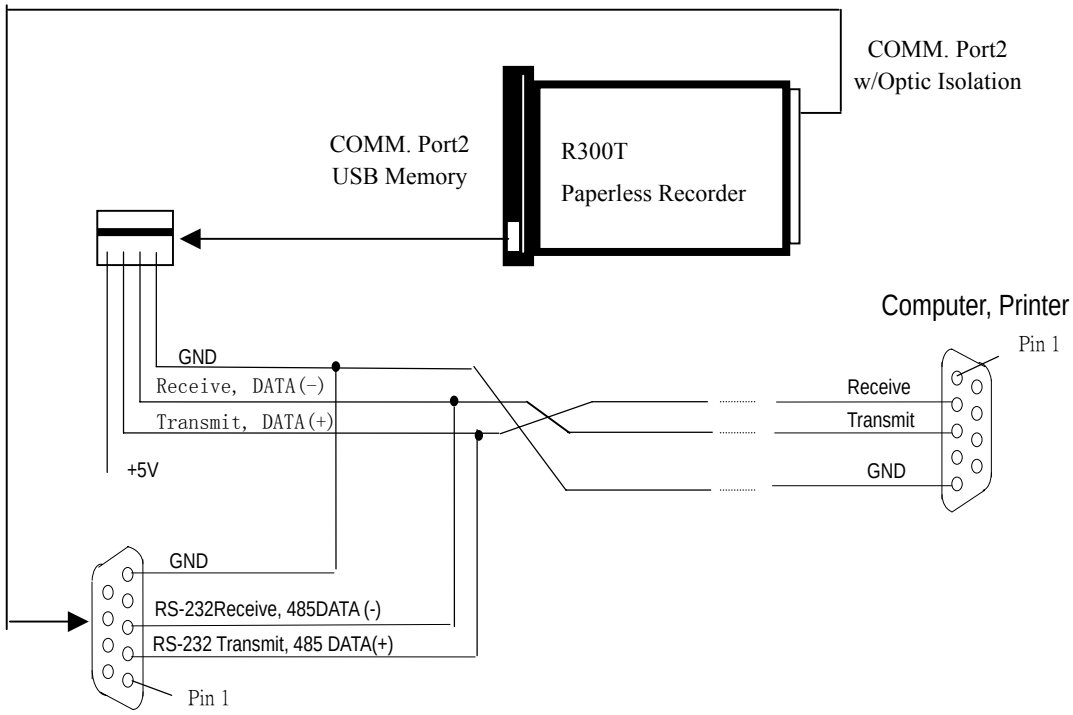

FIGIII. 2-7-1

# SECTION 4 COMMUNICATION & PRINTING

## CHAPTER 1 COMMUNICATION

**R300T** Intelligent Color Paperless Recorder can use RS-232C or RS-485 to communicate with upper level computers. Actually, which type will be selected, depending on customer's decision. At the same time, the compatible management software of the Upper level computer of **R300T** Series Intelligent Color Paperless Recorder was developed. It is convenient for the customers to remote monitoring, configuration, transmitting storage data, data management, reporting and printing of the paperless recorder.

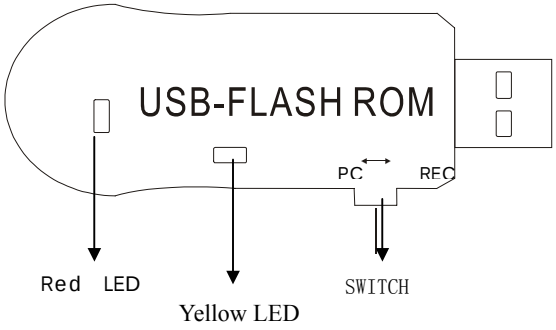
### 1.1 Communication Design



## 1.2 USB-FLASH ROM (Ref. as Memory Bar) Connection

**T300R** Color Paperless Recorder can be connected to USB Memory Bar through the port on the right side of front panel, there are two size of Memory Bar Capacity to chose: 64Mb or 128Mb. Memory Bar stores data full automatically, without manually operation. Memory bar can save recent of content of **T300R** Color Paperless Recorder ROM, it will easily transfer related information to PC, then analyzing data and saving them.

Operation：




1. Memory Bar and PC Connection

REC ◄► PC，when switch to PC, Insert Memory Bar into the USB port of PC, Using《CSR Analysis Software》processing Memory Bar's retrieving, saving, displaying and analysis functions, etc.

2. Memory Bar and **R300T** Connection

. Entering R300T Color Paperless Recorder "COMMUNICATION CONFIGURATION" Setting，Select Communication Protocol as："MODBUS-RTU" Protocol，Set Baud Rate as"57600"，save and escape

. Turn the Switch on the side of Memory bar to "REC" side，insert to the USB port on the side of R300T Color Paperless Recorder，the data in ROM of R300T will load into Memory Bar automatically.

Note：(1). When Memory Bar connects to PC，communicates to PC，Yellow LED indicator continuous flashing. When yellow LED indicator off, communication complete, and the Memory Bar can be disconnected.

(2). When Memory Bar connects to R300T Color Paperless Recorder, Yellow LED indicator off, At the same time, the communication status sign, on the upper right corner of recorder, also continuous flashing. When recorder status sign stop flashing immediately, it means the data download is completed.

## 1.3 SR-BUS Communication Protocol

✧ Data Transmission Format :

Start Bit: 1、Data: 8、Stop Bit: 1、Parity: None.

✧ Unit Data Format :

Single Byte Fix Point = BTYE high 4 bit ASCII code + BTYE low 4 bit ASCII code

Three Byte Fix Point = low BYTE high 4 bit ASCII code + low BYTE low 4 bit ASCII code
+ high BYTE high 4 bit ASCII code + high BYTE low 4 bit ASCII code
+ decimal point high 4 bit ASCII code + decimal point low4 bit ASCII code

Four Byte Floating Point = FIRST high 4 bit ASCII code + FIRST low 4 bit ASCII code
+ SECOND high 4 bit ASCII code + SECOND low 4 bit ASCII code

+ THIRD high 4 bit ASCII code + THIRD low 4 bit ASCII code
+ FOURTH high 4 bit ASCII code + FOURTH low 4 bit ASCII code

Note: "Floating Point" Type is 4 byte，format used is IEEE-754 Standard (32 bit) ，with 24 digit precision, the high level of least bit is always "1"，so that this bit is not kept，the distribution of bits shown as follow：

1 digit sign bit
8 digit exponent bits
23 digit tail number bits
Symbol digit is the highest bit, tail number is the lowest bit, in the internal memory, the Bytes layout as follow:

Address: +0 +1 +2 +3
Content: MMMM MMMM MMMM MMMM E MMM MMMM S EEE EEEE
Where: S: sign bit, 1= Negative, 0 = Positive
E: exponent bit (between two bytes), shift 127
M: 23 digit tail number bits, highest bit"1"
For Example : 12.5 in Hexadecimal as 0x00004841
Where : Exponent is 0x82, Tail number is 0x480000, Calculation of this number as follow,
(1+0x480000/0x800000) * 2^(0x82-127)) = 1.5625 * 8 = 12.5

## ✧ INSTRUMENT COMMUNICATION DATA FORMAT

| @ | DE | PACKET TYPE | PACKET DATA | CRC | CR |
|---|---|---|---|---|---|

Note：@ - Communication Command Start Bit
DE - Instrument Model Number (Double Byte)
PACKET TYPE - Operation Command (Double Byte)
PACKET DATA - Command and Data of corresponding various operation Command(Length are different by the Commands)
CRC - Detection Byte (expect @, NOR value of some other bytes in front of CRCByte, that is NOR value of DE (ASII) and PACKET TYPE $_{ASCII}$ and PACKET DATA $_{ASCII}$)
CRC = DE$_{ASCII}$ ⊕ PACKET TYPE $_{ASCII}$⊕ PACKET DATA$_{ASCII}$
CR - End Symbol

## ✧ Read Dynamics Parameters

Command Format：

| 1 | 2-3 | 4-5 | 6-7 | 8 |
|---|---|---|---|---|
| @ | DE | RD | CRC | CR |

Answer：

| 1 | 2-3 | 4-5 | 6-65 | 66-67 | 68 |
|---|---|---|---|---|---|
| @ | DE | RD | PACKET DATA | CRC | CR |

## ✧ PACKET DATA

See Table for Details

| Reg. Addr | DESCRIPTION | Reg. Addr | DESCRIPTION |
|---|---|---|---|
| 0000 | Modified Mark | 0001 | 4 (LOW) + 8 (HIGH) RELAY STATUS |
| 0002 | RESERVE | 0003 | CHANNEL |
| 0004 | YEAR + MONTH | 0005 | DAY + HOUR |
| 0006 | MINUTE + SECOND | 0007 | RESERVE |
| 0008 | CJC | 0009 | RESERVE |
| 000A | Address（ADD2+ADD1） | 000B | Address（ADD0）+ CYC. MARK |
| 000C | RESERVE | 000D | RESERVE |
| 000E | RECORDER NO._MON + RECORDER NO._DAY | 000F | RECORDER NO. |
| 0010 | CH 1 Real Value (HIGH) | 0011 | CH 1 Real Value (LOW) |
| 0012 | CH 2 Real Value (HIGH) | 0013 | CH 2 Real Value (LOW) |
| 0014 | CH 3 Real Value (HIGH) | 0015 | CH 3 Real Value (LOW) |
| 0016 | CH 4 Real Value (HIGH) | 0017 | CH 4 Real Value (LOW) |
| 0018 | CH 5 Real Value (HIGH) | 0019 | CH 5 Real Value (LOW) |
| 001A | CH 6 Real Value (HIGH) | 001B | CH 6 Real Value (LOW) |
| 001C | CH 7 Real Value (HIGH) | 001D | CH 7 Real Value (LOW) |
| 001E | CH 8 Real Value (HIGH) | 001F | CH 8 Real Value (LOW) |
| 0020 | CH 9 Real Value (HIGH) | 0021 | CH 9 Real Value (LOW) |
| 0022 | CH 10 Real Value (HIGH) | 0023 | CH 10 Real Value (LOW) |
| 0024 | CH 11 Real Value (HIGH) | 0025 | CH 11 Real Value (LOW) |
| 0026 | CH 12 Real Value (HIGH) | 0027 | CH 12 Real Value (LOW) |
| 0028 | CH 13 Real Value (HIGH) | 0029 | CH 13 Real Value (LOW) |
| 002A | CH 14 Real Value (HIGH) | 002B | CH 14 Real Value (LOW) |
| 002C | CH 15 Real Value (HIGH) | 002D | CH 15 Real Value (LOW) |
| 002E | CH 16 Real Value (HIGH) | 002F | CH 16 Real Value (LOW) |
| 0030 | CH 1 Instant Flow Value (HIGH) | 0031 | CH 1 Instant Flow Value (LOW) |
| 0032 | CH 2 Instant Flow Value (HIGH) | 0033 | CH 2 Instant Flow Value (LOW) |
| 0034 | CH 3 Instant Flow Value (HIGH) | 0035 | CH 3 Instant Flow Value (LOW) |
| 0036 | CH 4 Instant Flow Value (HIGH) | 0037 | CH 4 Instant Flow Value (LOW) |
| 0038 | CH 5 Instant Flow Value (HIGH) | 0039 | CH 5 Instant Flow Value (LOW) |
| 003A | CH 6 Instant Flow Value (HIGH) | 003B | CH 6 Instant Flow Value (LOW) |
| 003C | CH 7 Instant Flow Value (HIGH) | 003D | CH 7 Instant Flow Value (LOW) |
| 003E | CH 8 Instant Flow Value (HIGH) | 003F | CH 8 Instant Flow Value (LOW) |
| 0040 | CH 9 Instant Flow Value (HIGH) | 0041 | CH 9 Instant Flow Value (LOW) |
| 0042 | CH 10 Instant Flow Value (HIGH) | 0043 | CH 10 Instant Flow Value (LOW) |
| 0044 | CH 11 Instant Flow Value (HIGH) | 0045 | CH 11 Instant Flow Value (LOW) |
| 0046 | CH 12 Instant Flow Value (HIGH) | 0047 | CH 12 Instant Flow Value (LOW) |
| 0048 | CH 13 Instant Flow Value (HIGH) | 0049 | CH 13 Instant Flow Value (LOW) |
| 004A | CH 14 Instant Flow Value (HIGH) | 004B | CH 14 Instant Flow Value (LOW) |
| 004C | CH 15 Instant Flow Value (HIGH) | 004D | CH 15 Instant Flow Value (LOW) |
| 004E | CH 16 Instant Flow Value (HIGH) | 004F | CH 16 Instant Flow Value (LOW) |
| 0050 | CH 1 Flow Value HIGH (HIGH) | 0051 | CH 1 Flow Value HIGH (LOW) |
| 0052 | CH 2 Flow Value HIGH (HIGH) | 0053 | CH 2 Flow Value HIGH (LOW) |
| 0054 | CH 3 Flow Value HIGH (HIGH) | 0055 | CH 3 Flow Value HIGH (LOW) |
| 0056 | CH 4 Flow Value HIGH (HIGH) | 0057 | CH 4 Flow Value HIGH (LOW) |
| 0058 | CH 5 Flow Value HIGH (HIGH) | 0059 | CH 5 Flow Value HIGH (LOW) |
| 005A | CH 6 Flow Value HIGH (HIGH) | 005B | CH 6 Flow Value HIGH (LOW) |
| 005C | CH 7 Flow Value HIGH (HIGH) | 005D | CH 7 Flow Value HIGH (LOW) |
| 005E | CH 8 Flow Value HIGH (HIGH) | 005F | CH 8 Flow Value HIGH (LOW) |
| 0060 | CH 9 Flow Value HIGH (HIGH) | 0061 | CH 9 Flow Value HIGH (LOW) |
| 0062 | CH 10 Flow Value HIGH (HIGH) | 0063 | CH 10 Flow Value HIGH (LOW) |
| 0064 | CH 11 Flow Value HIGH (HIGH) | 0065 | CH 11 Flow Value HIGH (LOW) |

| | | | |
|---|---|---|---|
| 0066 | CH 12 Flow Value HIGH (HIGH) | 0067 | CH 12 Flow Value HIGH (LOW) |
| 0068 | CH 13 Flow Value HIGH (HIGH) | 0069 | CH 13 Flow Value HIGH (LOW) |
| 006A | CH 14 Flow Value HIGH (HIGH) | 006B | CH 14 Flow Value HIGH (LOW) |
| 006C | CH 15 Flow Value HIGH (HIGH) | 006D | CH 15 Flow Value HIGH (LOW) |
| 006E | CH 16 Flow Value HIGH (HIGH) | 006F | CH 16 Flow Value HIGH (LOW) |
| 0070 | CH 1 Flow Value LOW (HIGH) | 0071 | CH 1 Flow Value LOW (LOW) |
| 0072 | CH 2 Flow Value LOW (HIGH) | 0073 | CH 2 Flow Value LOW (LOW) |
| 0074 | CH 3 Flow Value LOW (HIGH) | 0075 | CH 3 Flow Value LOW (LOW) |
| 0076 | CH 4 Flow Value LOW (HIGH) | 0077 | CH 4 Flow Value LOW (LOW) |
| 0078 | CH 5 Flow Value LOW (HIGH) | 0079 | CH 5 Flow Value LOW (LOW) |
| 007A | CH 6 Flow Value LOW (HIGH) | 007B | CH 6 Flow Value LOW (LOW) |
| 007C | CH 7 Flow Value LOW (HIGH) | 007D | CH 7 Flow Value LOW (LOW) |
| 007E | CH 8 Flow Value LOW (HIGH) | 007F | CH 8 Flow Value LOW (LOW) |
| 0080 | CH 9 Flow Value LOW (HIGH) | 0081 | CH 9 Flow Value LOW (LOW) |
| 0082 | CH 10 Flow Value LOW (HIGH) | 0083 | CH 10 Flow Value LOW (LOW) |
| 0084 | CH 11 Flow Value LOW (HIGH) | 0085 | CH 11 Flow Value LOW (LOW) |
| 0086 | CH 12 Flow Value LOW (HIGH) | 0087 | CH 12 Flow Value LOW (LOW) |
| 0088 | CH 13 Flow Value LOW (HIGH) | 0089 | CH 13 Flow Value LOW (LOW) |
| 008A | CH 14 Flow Value LOW (HIGH) | 008B | CH 14 Flow Value LOW (LOW) |
| 008C | CH 15 Flow Value LOW (HIGH) | 008D | CH 15 Flow Value LOW (LOW) |
| 008E | CH 16 Flow Value LOW (HIGH) | 008F | CH 16 Flow Value LOW (LOW) |

TABLE 7-3-1

## 1.4 MODBUS_RTU Communication Protocol

✧ Data Communication Format

1 start bit, 8 data bits, 1 stop bit, None Odd/Even Check bit.

✧ Instrument Data Format

2 Byte Register Value = Register high 8 bits Binary Value + Register Low 8 bits Binary Value

✧ Instrument Communication

✧

READ register Command Format：

| 1 | 2 | 3 | 4 | 5 | 6 | 7 – 8 |
|---|---|---|---|---|---|---|
| DE | 3 | Start Register High Bit | Start Register Low Bit | Register High Bit | Register Low Bit | CRC |

Answer：

| 1 | 2 | 3 | 4-5 | 6-7 | … | M*2+2 – M*2+3 | M*2+4 – M*2+5 |
|---|---|---|---|---|---|---|---|
| DE | 3 | Byte Count M*2 | Register Data 1 | Register Data 2 | … | Register Data M | CRC |

DE： Device Address (1-200) Single Byte

CRC： Check Byte，Using CRC-16 Cyclic Redundancy Error Check，Details See “MODBUS Protocol Information”.

Register Definition Table is the same as TABLE 7-3-1.

# CHAPTER 2 PRINTING

The instrument, with RS232 communication function, can connect to printers with serial port and print. The printer port is 9 pin communication port on the rear of instrument. Printer types and Communication Baud Rate can be set at communication configuration.

## 2.1 Timed Printing

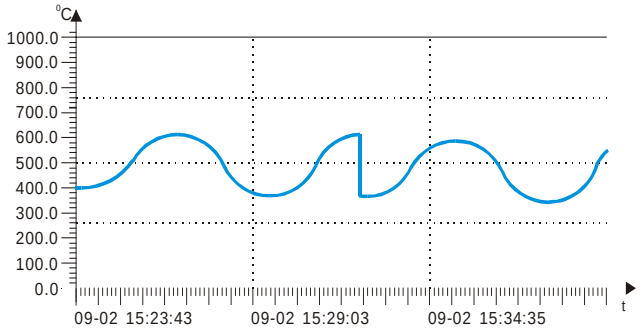
When the real-time measuring data need to be printed, the "PRINT INTERVAL" parameter will be set in the communication configuration, 0 to 240 minutes can be set, "0" means no print output. When instrument reaches the setting time, the real-time measuring data of all channels will be printed out, shown as below. On any screen, pressing "F1"+"PRINT" key, the real-time measuring value will be printed out.

```
--------------------------
CH1 = 428.0 ℃
CH2 = 548.3 ℃
CH3 = 788.3 ℃
CH4 = 787.7 ℃
2002-09-02 14:11:53
```

## 2.2 Historical Record Printing

Press "PRINT" Key，the "HISTORICAL RECORD PRINT" Setting Window will be pop-up, shown as follow. Set printing Channel, Printing Curves or Printing value, Division compressing rate, print recording timing, The lowest line of the window is the time range of instrument historical data record. After setting is done, moving cursor to "ACCEPT" sign，press "ENT" key then print out. The result of print-out will be shown as follow:

```
          Historical Record Print
Channel: 1              Type: Trend
Multiple: 01            Interval: 00:04
Starting: 02-09-02 15:23:43
Ending:   02-09-04 09:09:10
          Enter         Exit
02-09-02 15:23:43 ~ 02-09-04 10:27:24
```



# SECTION 5 MAINTENCE

At Okaway we take pride in providing the best customer service in support of high quality products that work reliably in tough applications. We make it our business to continuously improve our service and product strategies to be responsive to customer requirements.